



Dimond Engineering

CIVIL ENGINEERING and ARCHITECTURE



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Ever think about building a house, a store, a restaurant, and wondered how to go about it? Then Civil Engineering and Architecture™ is the course for you. The major focus of the course is a long-term project that involves the development of a local property site. As you learn about various aspects of civil engineering and architecture, you will apply what you learn to the design and development of this property. There is flexibility for you and your teacher in developing the property as a simulation or as a real-world experience that civil engineers and architects experience when developing property. The course covers the following:

- The Roles of Civil Engineers and Architects
- Project Planning
- Site Planning
- Building Design
- Project Documentation and Presentation

In addition, you will use Rivet, which is a state of the art 3D design software package from AutoDesk, to help you design solutions to solve your major course project. Working in teams, you will learn about documenting your project, solving problems, and communicating your solutions to other students and members of the professional community of civil engineering and architecture.

Materials required:

- ✓ D-Ring binder
- ✓ 3-Ring dividers
- ✓ Pen, pencil and eraser
- ✓ Flashdrive
- ✓ Calculator

Grading Policy

Notes / Classwork / Homework / Participation	20 %
Design Projects/Problems	40 %
Test / Quizzes	30 %
Citizenship	10 %
	100 %

A 89.5-100% **B** 79.5 -89.4% **C** 69.5-79.4% **D** 59.5-69.4% **F** below 59.5%

Design projects; These will be evaluated according to the project rubric that will be provided in the introduction of each project.

Tests & Quizzes; Tests will be given generally at the middle and/or the end of a Unit. Notes are not allowed. Quizzes will be given routinely. The use of notes is allowed during the quizzes unless otherwise indicated.

Notes; The student is required to keep a three ring binder with notes and projects of the class, and an engineering notebook according to the specifications of the Dimond Engineering Program.

Classwork; Most of the assignments including computer work will be done during class time. Be aware that time will be a restriction to complete your projects and assignments, use it wisely!!!

Homework; It will be assigned to reinforce the information taught during class. It will be kept in the three ring binder in a special section for homework.

Participation; All the projects of this class involve the collaboration of class members, it is important to work as a whole, be proactive and creative.

Grading Policy Citizenship Grade

A	B	C	D	F
On task at all time	On task most of the time	On task more of the time than off	Off task more often than on	Routinely off task
Prepared for class all of the time	Prepared for class most of the time	Prepared for class more often than not	Unprepared for class	Always unprepared for class
Works well with peers and teacher at all times	Works well with peers and teacher most of the time	Respectful of teacher and peers	Disrespectful at times	Disrespectful of peers and teacher more often than not
Exceptional behavior	No negative behaviors	Few disruptive behaviors	Frequent disruptive behaviors	Disrupts class frequently
Actively participates in class daily	Regularly participates in class	Participates more than not	Minimal participation in class	No participation in class
Enhances class performance by his/her presence	Sets a good example in class	Responds appropriately to critiques	Questions authority	Continually questions authority
<2 unexcused tardies or absences	2 unexcused tardies or absences	3 unexcused tardies or absences	4 unexcused tardies or absences	5 or more unexcused tardies or absences

Class Conduct (Expected Pattern of Behavior)

RESPECT RESPONSIBILITY RELIABILITY COOPERATION HONESTY	School, Teachers, Classmates, Equipment
	Assume actions / consequences
	To do what is expected or required
	To work with others toward a common goal
	To be sincere and to have integrity

Civil Engineering and Architecture – Topical Outline

Unit 1: Overview of Civil Engineering and Architecture

Time Days: 5 days

Lesson 1.1: Civil Engineering and Architecture Overview

- 1.1.1 Civil Engineering
- 1.1.2 Architecture
- 1.1.3 Historical implications
- 1.1.4 Introduction to Roles of All Players/Stakeholders
- 1.1.5 Responsibilities and ethics

Unit 2: Introduction to Projects

Time Days: 25 days

Lesson 2.1: Overview of Project Design

- 2.1.1 Purpose
- 2.1.2 Design Project Scenario (snapshot program requirements and teaming)

Lesson 2.2: Project Documentation

- 2.2.1 Portfolio Components
- 2.2.2 Sketching

- 2.2.3 Journals
- 2.2.4 Specifications Manual
- 2.2.5 Working Drawings

Unit 3: Project Planning

Time Days: 15 days

Lesson 3.1: Site Information

- 3.1.1 Site Selection
 - 3.1.1.1 History of Site
 - 3.1.1.2 Site Visit
 - 3.1.1.3 Identify Neighboring Properties
 - 3.1.1.4 Suitability of the site
- 3.1.2 Regulations
 - 3.1.2.1 Municipal Regulations
 - 3.1.2.2 Archaeological Considerations
 - 3.1.2.3 Environmental Limitations
 - 3.1.2.4 Covenants, Deed, and Zoning Restrictions
- 3.1.3 Viability Analysis
 - 3.1.3.1 Surroundings
 - 3.1.3.2 Infrastructure
 - 3.1.3.3 Traffic Flow Analysis
 - 3.1.3.4 Utilities
 - 3.1.3.5 Local considerations/constraints—neighbors, zoning
 - 3.1.3.6 Lot Size

Lesson 3.2: Development Options, Selection of Project, and Revisiting Viability Analysis

- 3.2.1 Development
- 3.2.2 Residential
- 3.2.3 Commercial
- 3.2.4 Industrial
- 3.2.5 Public/Private Assembly Places
- 3.2.6 Plan Unit Development (PUD)

Unit 4: Site Planning

Time Days: 40 days

Lesson 4.1: Description of Property

- 4.1.1 Surveying
- 4.1.2 Maps
- 4.1.3 Metes and Bounds System
- 4.1.4 Lot and Block System

Lesson 4.2: Site Plan Requirements

- 4.2.1 Topography
- 4.2.2 Number of Spaces

- 4.2.3 Types of Spaces
- 4.2.4 Sizes of Spaces
- 4.2.5 Activities in Spaces
- 4.2.6 Amenities
- 4.2.7 Special Needs
- 4.2.8 Support Facilities
- 4.2.9 Detached Buildings

Lesson 4.3: Site Plan Layout

- 4.3.1 Wetland Identification and Protection
- 4.3.2 Frontage
- 4.3.3 Easements, Utility Right of Ways, Setbacks
- 4.3.4 Utility Availability and Corridors
- 4.3.5 Building Size and Orientation

Lesson 4.4: Public Ingress and Egress

- 4.4.1 Roadways
- 4.4.2 Pathways
- 4.4.3 Sidewalks
- 4.4.4 Off-Street Parking
- 4.4.5 Signage and Markings
- 4.4.6 Lighting
- 4.4.7 Universal Access

Lesson 4.5: Site Grading

- 4.5.1 Identification of Sub-Surface Conditions
- 4.5.2 Topographic design
- 4.5.3 Top Soil
- 4.5.4 Storm Water Management
- 4.5.5 Cut and Fill Balances
- 4.5.6 Excavation

Lesson 4.6: Utilities

- 4.6.1 Water Supply
- 4.6.2 Wastewater
- 4.6.3 Electrical
- 4.6.4 Gas
- 4.6.5 Cable
- 4.6.6 Telephone

Lesson 4.7: Landscaping

- 4.7.1 Function
- 4.7.2 Green space
- 4.7.3 Xeriscape—self sufficient without need of additional water
- 4.7.4 Irrigation systems

Lesson 4.8: Water Supply and Wastewater Management

- 4.8.1 Water
- 4.8.2 Wastewater
- 4.8.3 Management methods

Unit 5: Architecture

Time Days: 50 days

Lesson 5.1: Architectural styles

- 5.1.1 Structural style
- 5.1.2 Building material, color, proportion, and rhythm

Lesson 5.2: Floor Plans

- 5.2.1 Arrangement of Spaces
- 5.2.2 Building Envelope
- 5.2.3 Windows
- 5.2.4 Doors
- 5.2.5 Wall Types
- 5.2.6 Floor Types
- 5.2.7 Equipment Layout
- 5.2.8 Universal Accessibility
- 5.2.9 Vertical transport

Lesson 5.3: Energy Systems

- 5.3.1 Minimum Code Requirements
- 5.3.2 Green Building Options
- 5.3.3 Smart Building Technologies
- 5.3.4 Utility Cost Analysis
- 5.3.5 Emerging Custom Measures

Lesson 5.4: Elevations

- 5.4.1 Exterior
- 5.4.2 Interior

Lesson 5.5 Sections and Details

- 5.5.1 Identification
- 5.5.2 Building Section
- 5.5.3 Wall Section
- 5.5.4 Construction Details

Lesson 5.6: Schedules

- 5.6.1 Door and Window Schedules
- 5.6.2 Finish Schedules

Lesson 5.7: Mechanical, Electrical, and Protection Systems

- 5.7.1 Plumbing
- 5.7.2 HVAC
- 5.7.3 Electrical systems

- 5.7.4 Power Requirements
- 5.7.5 Electrical Plan
- 5.7.6 Lighting Plan
- 5.7.7 Protection Systems
- 5.7.8 Fire, Smoke, and Gas Detection Systems
- 5.7.9 Fire Suppression Systems
- 5.7.10 Security Systems

Unit 6: Structural Engineering

Time Days: 20 days

Lesson 6.1: Introduction to Structural Engineering

- 6.1.1 Structural Engineering
- 6.1.2 Various Loads
- 6.1.3 Wind Loads
- 6.1.4 Snow Loads
- 6.1.5 Dead Loads
- 6.1.6 Live Loads

Lesson 6.2: Roof Systems

- 6.2.1 Materials
- 6.2.2 Types of trusses
- 6.2.3 Load Calculations for roof members
- 6.2.4 Architectural styles

Lesson 6.3: Columns and Beams

- 6.3.1 Materials
- 6.3.2 Loading
- 6.3.3 Fire Proofing
- 6.3.4 Connections
- 6.3.5 Column schedules
- 6.3.6 Sizing of members

Lesson 6.4: Foundations

- 6.4.1 Types
- 6.4.2 Soil Bearing Capacities
- 6.4.3 Drainage
- 6.4.4 Piers
- 6.4.5 Settling

Unit 7: Presentations and Reviews

Time Days: 20 days

Lesson 7.1: Critiques and Reviews

- 7.1.1 Self Assessment
- 7.1.2 Peer Review
- 7.1.3 Public Exhibit
- 7.1.4 Interviews
- 7.1.5 Competitions

Lesson 7.2: Final Presentations

- 7.2.1 Peer

Student Revit Skills

The following is a list of skills that students should learn and be able to create or incorporate into a Revit model.

**Revit Skills
with Date**

Self-Assessment

Basic Skills

Understand Menu Structure
Use Basic Tools (save, rotate, zoom, split, align, offset, etc.)
Floor
Walls (type selector, duplicate, wall layers, height, etc.)
Doors
Windows
Roof (slope, extrude, pick walls, lines)
Levels
Components (furniture, plumbing, appliances, web library, etc.)
Dimensions (Temporary vs. Permanent)
Text
Properties (edit features/size of an object)
View Properties

Working Drawings/Views

Title Blocks (place views, create a custom title block)
Sections
Elevations
Rendering
Camera (rendering views, walkthrough)
Symbols (electrical, structural, etc.)

Advanced Skills

Site Work
Property Lines
Topography
Split Surface
Pad
Tags (door, window, room)
Schedules (square footage, door, window, etc...)
Stairs
Create Solids (extrude, sweep, loft)

Cost Calculator

Materials

Revit Resources

Help Menu

Autodesk support and training materials for

Revit at www.autodesk.com

www.rugi.org
