

Civil Engineering and Architecture – Topical Outline

Unit 1: Overview of Civil Engineering and Architecture

Week 1

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

Weeks 2-5

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

Weeks 6-9

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

Weeks 10-18

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

Weeks 19-29

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

Weeks 30-34

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

Weeks 36-40

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
- 7.2.2 School panel
- 7.2.3 Parents
- 7.2.4 School board
- 7.2.5 Other community groups