

General Course Syllabus for Architectural Drafting and Design, 4E

Usability

This general course outline follows the chapters that are presented in the text. The syllabus can assist in the planning and set-up of a course about architectural drafting and design. The chapter-based outlines should be converted into a schedule that can be followed by the student and instructor. The time estimates provided in this syllabus are estimates and should be modified accordingly. The instructor should remember that it is not considered good pedagogy if the entire text is covered yet the students only receive a nominal content and skill development during the course.

Objective of the Course

This course is designed to introduce student to the concepts, practices, standards, and drafting techniques needed for architectural design. A majority of the book is written for residential construction with the final four chapters dedicated to commercial design. Students learn both the content and skills necessary to become a proficient drafter in the field of architecture.

Pre-requisites

- Knowledge of basic computer operations and file management.
- Basic understanding of general drafting practices using both hand tools and CADD.

Outline

Chapter 1 - Professional Architectural Careers, Office Practice, and Opportunities

Time Estimate: 1-2 Contact hours

Chapter Objectives

- Describe the career opportunities available to a student who has mastered the skills presented in this text.
- Identify the responsibilities of both the beginning and the experienced drafter.
- Relate the necessity of good math, writing and drawing skills for success in a drafting career.
- Differentiate between the different roles and responsibilities of the designer, architect, interior designer, and urban planner.
- Distinguish the work carried out by structural, electrical, mechanical, and civil engineers.
- Describe the related fields of illustrator, model maker, specification writer, inspector, and worker in the field of construction.
- Explain the basic design, financial considerations, clientele relationships, and common procedures of the design process.
- Relate the need to design structures that are within a client's budget, based on cost estimates and the source of financing to the design process.
- Delineate the basic stages of design: initial contact, preliminary design studies, initial working drawings, final design considerations, completion of working drawings, permit procedures, and job supervision.
- Describe the function of bubble drawings and scaled sketches.

- Differentiate between the types of working drawings, how they are typically sequenced, who is responsible for their execution, what each drawing typically shows, and explain the typical sequence in which drawings are created.

Chapter 2 - Architectural Drafting Equipment

Time Estimate: 2-3 Contact hours

Chapter Objectives

- Identify the basic equipment necessary for architectural drafting.
- Describe the proper usage of drafting tools.
- Distinguish the two basic pencil types, as well as understand the usage of different lead thickness and grades.
- Identify the function of technical pens.
- Differentiate between eraser types, and erasure techniques.
- Describe the types and usage of various drafting instruments, including: compass, dividers, parallel bars, triangles, architectural templates, and irregular curves.
- Describe the arm and track drafting machines and their operation.
- Distinguish between scale types and notations.
- Utilize an architect's, engineer's, and metric scale to properly read a drawing.
- Describe the standard usage of metric (SI) linear units in architectural drafting.

Chapter 3 - Drafting Media and Reproduction Methods

Time Estimate: 1 Contact hour

Chapter Objectives

- Identify factors, which influence the selection of drafting media.
- Differentiate between vellum and polyester film.
- Indicate which media produce the best reproductions.
- List standard sheet sizes.
- Describe the components of a standard architectural title block.
- Explain the process of making a diazo print.
- Identify the types of prints possible, and remember diazo safety precautions.
- Identify the basics of processing and storing microfilm.

Chapter 4 - Sketching and Orthographic Projection

Time Estimate: 2-3 Contact hours

Chapter Objectives

- Identify the appropriate tools and materials for sketching.
- Demonstrate the process for drawing straight lines.
- Illustrate three different methods of sketching circles: the trammel method, the hand compass method, and the method for drawing large circles with pencil, string, and a pin or nail.
- Describe the purpose of measurement lines and proportions.
- Demonstrate how proportions and measurements can be established with either a pencil or the block technique.
- Delineate typical sketching procedures, including the drawing of irregular shapes.
- Sketch multiview drawings.

- Demonstrate isometric sketching techniques, including non-isometric lines and isometric circles.
- Explain the nature of an orthographic projection.
- Demonstrate methods for transferring the size of features from one multiview projection to another.
- Identify the primary views used in architectural multiview drawings. and
- Project circles and other features of an inclined plane in a multiview drawing.

Chapter 5 - Architectural Lines and Lettering

Time Estimate: 1-2 Contact hours

Chapter Objectives

- Distinguish between the following types of lines: construction, guide, object, dashed, extension, dimension, leader, and break lines.
- List the techniques and sequence of applying line types to drawings.
- Use proper techniques for applying pencil to vellum, polyester lead to polyester film, and ink to vellum or polyester film.
- Locate points in CADD associated with the Cartesian coordinate point entry system (including absolute, relative, and polar coordinates), as well as picking points with the screen cursor.
- Utilize the grid and snap commands, and read the coordinate display.
- Demonstrate the proper technique used to make letters on a drawing.
- Identify various lettering tools and machines commonly used in the architectural drafting industry. and
- Utilize a CADD program to create letters of various sizes, styles, and fonts for a drawing

Chapter 6 - Computer-Aided Design and Drafting in Architecture

Time Estimate: 1-2 Contact hours

Chapter Objectives

- Define basic CADD terminology.
- Understand the function, role, and creation of symbols in CADD.
- Explain the role of layers in CADD, and know typical layer identification protocol, including long and short format names recommended by the AIA.
- Describe the components commonly found in a CADD workstation.
- Explain what functions microcomputers serve.
- Describe the productivity possible with computers.
- Relate the gain in creativity with CADD.
- Identify the elements of ergonomic concern relative to CADD.
- Enumerate and explain the function of the components that constitute a CADD workstation—the computer, the digitizer, and plotters and printers.
- Distinguish between digitizing and scanning of drawings.

Chapter 7 - Building Codes and Interior Design

Time Estimate: 2-3 Contact hours

Chapter Objectives

- Recognize the potential dangers of built structures, particularly residences that do not follow code.

- Identify the national codes typically used in the United States and know who is responsible for determining which code is applied to the design process.
- Explain what an occupancy type is, and that single-family dwellings are classified as r-3, and comprehend the difference between habitable and nonhabitable spaces.
- Describe the minimum dimensions and requirements of doors.
- Identify the elements of a house that constitute emergency egress openings, as well as their minimum sizes.
- Identify the requirements for smoke alarms.
- Delineate the dimensional requirements for halls, stairs, and rooms.
- Explain the general criteria for domestic light, ventilation, heating, and sanitation requirements. and
- Identify climatic and geographic design criteria, which will have bearing on the design of a structure.

Chapter 8 - Room Relationships and Sizes

Time Estimate: 2-3 Contact hours

Chapter Objectives

- Identify important factors affecting the process of design.
- Explain the value of client wish lists, identifying minimum requirements, and the need for bubble drawings.
- Cite the five basic spaces that are typically identified as living areas.
- Identify the typical functions, orientation, typical room adjacencies, and sizes of the following rooms: living room, family room, dining room, den and nook.
- Describe the space requirements of furnishings, particularly of tables and chairs.
- State the ideal orientation, location relative to traffic patterns and plumbing, and egress requirements of bedrooms.
- Contrast the different size requirements of spare and master bedrooms.
- Identify the minimum sizes of both wall and walk-in closets.
- Describe how the following areas constitute service areas: bath, kitchen, utility room, and garage.
- Differentiate between a half-, three-quarter, and full bath.
- Specify the necessary types and locations of bathrooms within a house.
- Identify appropriate adjacencies and orientation of a kitchen.
- Cite the main work areas of a kitchen: the storage area, the preparation area and the cleaning area.
- Explain that a kitchen's storage area consists of the refrigerator, the freezer, and cabinet space for food and utensils, and cite the typical space requirements of these elements.
- Describe the preparation area of a kitchen including the sink, cooking units, and a counter area and specify the minimum dimensions of these components.
- Identify the cleaning center area including the sink, garbage disposal, and dishwasher, and describe the typical configuration of these components.
- Explain a kitchen's work triangle, its typical measurements, and the ideal appliance arrangements.
- Identify the purpose of usage adjacencies of a utility room.
- Describe the standard sizes of a garage, as well as typical storage and amenity arrangements.

- Delineate the traffic pattern requirements of hallways, guest and service entries, and stairs.
- Cite configuration requirements to make a home accessible to a wheelchair.

Chapter 9 - Exterior Design Factors

Time Estimate: 2-3 Contact hours

Chapter Objectives

- Identify site factors which affect the design of a house, including neighborhood property values, review board controls, and access to the site.
- Identify and explain the four elements of design.
- Describe how horizontal, vertical, and diagonal lines can affect the aesthetics of a design.
- Explain the significance of form to a design.
- Indicate the significance of color in both interior and exterior design, and define a color's hue, value, and intensity.
- Describe the affect of texture in a design.
- Cite the basic principles of design: rhythm, balance, proportion, and unity.
- Identify the salient features of various floor plan styles, including single level, split level, daylight basement, two story, dormer and multilevel.
- Distinguish between the characteristics of various exterior styles identified in the chapter.

Chapter 10 - Energy-Efficient Design and Construction

Time Estimate: 3 Contact hours

Chapter Objectives

- Explain that a number of energy-efficiency techniques do not cost much more than standard construction, and that energy-efficient homes offer numerous environmental and economic advantages.
- Describe the building elements covered by the model energy code.
- Cite the most effective energy-efficient construction techniques: framing, caulking, use of vapor retardants, and insulation procedures.
- Explain why caulking is effective, and identify places where caulking is best used.
- Explain why vapor barriers help save energy, and name locations where vapor retarders should be installed.
- Identify the venting requirements of garages.
- Cite recommended insulation valued for walls, floors, vaulted and flat ceilings, and know the percentage limit of wall openings.
- Articulate the basic principle of solar heating.
- Identify the two basic residential and commercial uses for solar energy as space heating and hot water.
- Distinguish between active and passive solar design strategies, and understand how some systems require a lifestyle commitment to make them work.
- Describe how building and zoning codes affect installation of solar systems.
- Calculate the recommended roof overhang for a given latitude, as well as specify other methods of achieving alternative overhang protection.
- Define direct solar gain, and note techniques of capturing and retaining such gain.
- Explain the concepts of thermal storage walls, roof ponds, and solariums.

- Articulate how the idea of envelope design works, cite its principle components, and discuss the disadvantages of the concept, including life safety concerns.
- Describe solar collector types, appropriate positioning, and storage systems, and backup requirements.
- Explain geothermal heating and cooling systems.
- Explain the function of photovoltaic modules.
- Describe how wind energy and hydroelectric energy are related to solar energy.

Chapter 11 - Site Orientation

Time Estimate: 1-2 Contact hours

Chapter Objectives

- Cite basic factors affecting the orientation of a house.
- Explain how terrain influences the configuration of a house.
- Describe the need to maximize views, and how to manage conflicts with other orientation factors.
- Identify an unobstructed southern exposure as the perfect solar site.
- Describe magnetic declination and its relationship to true north.
- Compare factors in selecting a solar site in both urban and suburban locations.
- Explain how landscaping can affect a solar site.
- Define *prevailing winds*, and identify geographic factors that can influence wind conditions.
- Utilize information regarding prevailing wind patterns to assist in selecting a site.
- Delineate architectural and landscaping strategies to offset the effect of wind.
- Identify methods to cool a structure with wind.
- Indicate architectural and landscaping design strategies, which can buffer a home from excessive noise.

Chapter 12 - Legal Descriptions and Plot Plan Requirements

Time Estimate: 2 Contact hours

Chapter Objectives

- Identify places where legal descriptions are filed.
- Name the basic forms of legal property descriptions: metes and bounds, rectangular system, and lot and block.
- Describe the metes and bounds system, know the typical units used, and understand how the point-of-beginning is used.
- Explain the basic divisions of the rectangular system, including its relationship to base lines and meridians.
- Define townships and sections.
- Explain the lot and block system.
- Enumerate the elements required for a plat and plot plan.
- Describe how contour lines are used to graphically show the topography of a site.
- State how grading plans are used to indicate existing and proposed topography.
- Contrast how public and private sewage systems are drafted.
- List items needed to complete a site analysis plan.
- Use a checklist to determine the completeness of a subdivision plan.
- Define a planned unit development (PUD).

Chapter 13 - Site Plan Layout

Time Estimate: 1-2 Contact hours

Chapter Objectives

- Identify the typical sheet sizes and scales used to draw site plans.
- Identify the factors that will influence the scale used on a site plan.
- Explain the site design considerations needed before beginning a new site plan.
- List the information that is necessary to complete a site plan.
- Describe the process used to lay out and dimension property lines.
- Complete the steps necessary to draft a basic site plan.
- Utilize field notes to draw and label appropriate contour lines on a site plan.
- Create a profile based on the contour lines from a site plan.
- Create a grading plan to indicated cut and fill areas that are based on the contour lines from a site plan.
- Utilize the site plan drawing checklist to ensure accuracy and quality on all site plans.
- Describe the advantages of using CADD to draft site plans and terrain models.

Chapter 14 - Floor-Plan Symbols

Time Estimate: 2 Contact hours

Chapter Objectives

- Explain that floor plans represent a horizontal section cut 4 feet above the finish floor, and that plans are generally drawn at $\frac{1}{4}'' = 1'0''$.
- Cite the drafted and CADD thicknesses of exterior, interior, and plumbing walls.
- Define poche', and know that it is done on the back of the sheet, is performed last, and is done lightly or darkly depending on the office.
- Differentiate drafting strategies of partial and full walls.
- Cite minimum guardrail requirements and construction standards.
- Identify CADD commands used to draw floor plan walls.
- Use a manual to reference basic door types, sizes, ADA requirements, and drawing conventions.
- Use a manual to reference basic window types, sizes, extent openable, and drawing conventions.
- Identify skylight types and their drawing conventions.
- Articulate the need for schedules, identify information described within it, know how to key schedules to a drawing, and how to configure and place schedules on a sheet.
- Identify the general sizes and drawing conventions of cabinets, fixtures and appliances found in kitchens, bathrooms, and utility rooms.
- List minimum stair width, tread, riser, landing, and head clearance requirements, as well as known drafting criteria for straight-run, winding, and spiral stairs.
- Cite minimum hallway and ramp standards.
- Differentiate between steel, masonry, and gas-burning fireplaces and barbecues, and describe the basic components of wood storage, cleanouts, and combustion air requirements.
- Describe solid fuel-burning appliances and direct-vent fireplaces.
- Delineate miscellaneous floor-plan symbols, including those for hose bibbs, concrete slabs, attic crawl space access, floor drains, and cross-section symbols.

- Articulate how CADD floor-plan symbols are stored, placed and moved, and how attributes are used.

Chapter 15 - Floor-Plan Dimensions

Time Estimate: 3 Contact hours

Chapter Objectives

- Define aligned dimensioning and know proper dimension numeral placement.
- Identify the standard dimension line placement and spacing for floor plans.
- State the standard height of dimension numerals (1/8"), and know both conventional English and metric unit application.
- Describe the standard method for dimensioning an exterior and interior wood framed wall.
- Cite dimensioning procedures for standard interior features, including refrigerators, cabinets, doors, and shower stalls.
- Access and implement dimensional data of common sizes of architectural features.
- Dimension masonry veneer, concrete block, and solid concrete construction.
- Distinguish specific (local) notes and general notes and place them properly in the drawing.
- Contrast specifications from drawing notes.
- Distinguish between hard and soft conversion of metric units and accurately calculate hard conversions from English to metric units of measure.
- Express metric units on a drawing, using standard rules for writing metric symbols and names.
- Specify common metric scales used in architectural drafting.
- Understand the point-to-point CADD dimensioning method.
- Cite various types of dimension-line terminators.
- Describe the typical procedures for drawing CADD leader lines for specific notes.

Chapter 16 - Floor-plan Layout

Time Estimate: 5 Contact hours

Chapter Objectives

- List basic sheet sizes commonly used in residential floor plans.
- Follow the steps outlined in chapter 16 to create a residential floor plan.
- Cite the factors that contribute to a well-balanced drawing.
- Compose a residential plan on a given sheet, taking into account scale, drawing area, and dimensions.
- Cite alternatives if there is not adequate space on a sheet for a given plan.
- Block out exterior and interior walls with appropriate thickness: lay out doors, windows, cabinetry, appliances, plumbing fixtures, fireplaces, and stairs.
- Use appropriate leads and line weights for both construction and finish lines.
- Properly dimension a residential floor plan.
- Place notes, room labels, drawing title and scale.
- Draft second-floor and basement plans.
- Utilize the process of using CADD to draft a floor plan.
- Describe the process of overlay drafting.
- Describe the role of layers in CADD floor plan drafting.

Chapter 17 - Electrical Plans

Time Estimate: 3-4 Contact hours

Chapter Objectives

- Differentiate between three phases of electrical installation: temporary, rough-in, and finish.
- Discern when it is appropriate to place electrical symbols on a floor plan and when they should be placed on a separate sheet.
- Define basic electrical terms.
- Cite rudimentary rules of electrical circuit design.
- Specify methods of wiring a home with energy conservation techniques.
- Articulate the advantages of home automation and identify three systems where automation is available.
- Draft basic electrical symbols, including switches, duplex receptacle outlets, ceiling and wall-mounted lights, and circuit lines.
- Identify basic service specification requirements, including service capacity, service entrance, meter base, and distribution panel locations.
- Understand metrics in electrical installations.
- Cite steps in drafting electrical floor plans.
- Explain the process for using CADD for electrical plans.

Chapter 18 – Plumbing Plans

Time Estimate: 3 Contact hours

Chapter Objectives

- Cite materials commonly used for residential plumbing.
- Identify plumbing fixtures typically included in residential plans.
- Specify methods to conserve energy in the plumbing installation.
- List attributes typically included in plumbing fixture schedules.
- Draft, using manual drafting or CADD, plumbing lines and symbols with proper line weights and abbreviations.
- Cite common residential water supply pipe sizes and placement of plumbing fixtures.
- Describe drainage and vent systems.
- Distinguish between single-line and detailed isometric drawing (plumbing riser diagram).
- Identify basic solar hot water system components and installation positions.
- Differentiate between public and private sewage disposal systems, and identify basic component of each system.
- Explain metrics in plumbing.
- Compare and contrast residential and commercial plumbing plans.
- Cite basic components of commercial plumbing plans.
- Describe how CADD applications can be used to draft plumbing plans.

Chapter 19 - Heating, Ventilation, and Air Conditioning

Time Estimate: 3 Contact hours

Chapter Objectives

- Explain that the National Energy Conservation Code regulates the exterior envelope and the selection of equipment that affects the consumption of power.
- Identify code requirements related to heating and cooling equipment and duct systems.

- Describe the basic concept of central forced-air systems.
- Explain the heating cycle of a central forced-air system.
- Explain how a cooling system works, and the two principles that make cooling possible.
- Describe how to provide proper duct spacing for forced-air heating and cooling systems.
- Describe the basic concept of hot water systems.
- Identify basic HVAC symbols.
- Explain the basic function of a heat pump, cite basic residential sizes, and specify ideal locations.
- Contrast zonal and central heating systems and list the advantages and disadvantages of each.
- Identify and compare the two types of zone heaters.
- Articulate the process of a radiant system and understand how it can generate cost savings compared to conventional convective systems.
- Cite the factors that contribute to effective control and placement of thermostats.
- Cite sources of indoor pollution and possible remedies to reduce the amount of pollution.
- Describe the need and function of an air-to-air heat exchanger.
- Specify both recommended air changes per hour, as well as identify the volume of recommended air movement.
- List the code requirements for HVAC exhaust systems.
- Calculate the volume of air to be moved for a given room or home.
- Identify the advantages and disadvantages of a central vacuum system.
- Understand the origin of the degree-day method to estimate annual energy consumption.
- Define basic HVAC terminology (see list below).
- Fill out a residential heating and cooling data sheet.
- Know basic steps used to prepare HVAC drawings.
- Distinguish between single- and double-line HVAC plans.
- Identify what both detail and section drawings illustrate, and what scales are typically used.
- Describe how schedules are used in HVAC drawings, and cite the kind of information included in schedules.
- Describe how HVAC CADD software configures ducts layouts.
- Describe how CADD pictorials, known as graphic models, aid in the design of duct lay-outs.

Chapter 20 - Roof Plan Components

Time Estimate: 1-2 Contact hours

Chapter Objectives

- Articulate the need to consider roof design long before the roof plan is drawn.
- Contrast between the functions of a roof plan and a roof framing plan, and be able to cite the basic elements of each.
- Define roof pitch and know how to look up or calculate the equivalent angle measurement.
- Cite when flat roofs are used and why, and know the capacity of diverters and parapets.
- Describe the configuration of shed, gable, A-frame, gambrel, hip, Dutch-hip, and mansard roofs.
- Define a dormer.
- Cite the factors that influence the selection of roofing materials.
- Explain the meaning of a roofer's square equalling 100 sq. ft.
- Describe built-up roofing composition and applications.

- Compare contrast shingles, tile, and metal plane.
- Know their basic materials, cite relative economies, durability.
- Know basic weights, appropriate slopes, and underlayment.

Chapter 21 - Roof Plan Layout

Time Estimate: 2-3 Contact hours

Chapter Objectives

- Cite basic roof drafting conventions, including line weights and types for roof edges, ridges, hips, Dutch hips, valleys, and walls below roofs.
- Explain the relationship between overhang dimensions, sun angles, and views.
- Determine ridge-lines for roofs with both equal and unequal pitches.
- Utilize sections and elevations to determine complex roof configurations.
- Describe the relationship between supporting walls and roof height.
- Explain the configuration of intersecting roof planes of wings of a structure joining at various angles and wall spans.
- Determine roof intersections of building elements with different wall heights.
- Identify nonstructural elements that must be incorporated into roof plans and how to draft such items.
- Describe the relationship between skylights, ceilings, and chase configurations.
- Explain roof drainage systems and drafting methods.
- Dimension roof plans judiciously.
- Follow steps outlined in this chapter to draw gable roof plans, hip roof plans, and Dutch hip roof plan.
- Demonstrate how CADD is used to draw roof plans.

Chapter 22 - Introduction to Elevations

Time Estimate: 1-2 Contact hours

Chapter Objectives

- Identify elevations as being a type of orthographic drawing, illustrating exterior building shapes, finishes, and vertical relationships.
- Explain that four elevations are typically required, but that more may be necessary if building walls are not at a 90-degree angle to each other.
- Differentiate between presentation and working elevations, and cite information typically identified in working drawings.
- Specify the scale(s) usually used to draft elevations.
- Describe typical methods of elevation layout.
- Identify drafting conventions used for common roofing materials, including asphalt shingles, wood shakes and shingles, clay, concrete and metal tile, and built-up roofing.
- Describe generally when to show skylights.
- Identify drafting conventions used for common exterior wall coverings, including wood, wood substitute, masonry, metal, and stucco.
- Discriminate between drawing too much and too little detail on doors and windows.
- Cite drafting conventions for rails, shutters, eave vents, and chimneys.
- Demonstrate that drawing elevations with CADD is often aided by the use of tablet-driven menus.

Chapter 23 - Elevation Layout and Drawing Techniques

Time Estimated: 1-2 Contact hours

Chapter Objectives

- Cite the three stages of elevation development: layout, drawing, and lettering.
- Identify the scales used to draw elevations such as $\frac{1}{4} = 1 - 0$ and $\frac{1}{8} = 1 - 0$
- Lay out the overall shape of the elevations using prints of the floor and roof plans.
- Determine the heights of a structure's basic horizontal components, including finish grade, floor and ceiling lines, standard header heights, and project vertical edges from the plan.
- Determine the height and shape of roofs using construction lines representing side views of the structure.
- Lay out all openings of an elevation including doors, windows, and skylights.
- Identify appropriate leads and line quality for finish-quality lines, as well as follow procedures to minimize smearing.
- Understand why it is common to highly detail the front elevation and only draw minimal information on the other elevations.
- Letter and compose requisite notes identifying siding, trim, flatwork, exposed structural elements, facias and barge rafters, and roofing materials.
- Properly dimension an elevation, including roof pitch.
- Describe the reason and process for developing alternative elevations.
- Identify the process for drawing structures with irregular floor plans.
- Use a roof plan to draw roof intersections on an elevation.
- Project grades from a plot or floor plan to an elevation.
- Identify the process for developing elevations in CADD.

Chapter 24 - Mill and Cabinet Technology, Cabinet Elevations, and Layout

Time Estimated: 2-3 Contact hours

Chapter Objectives

- Define millwork and know that the amount of construction documents depends on the specific requirements of the project.
- Differentiate between millwork designed for function and for appearance.
- Describe the functions and fabrication of baseboards, wainscots, chair rails, cornices, casings, mantels, and railings.
- Identify the two basic elements of kitchen cabinets, on base and upper cabinet, as well as cite their standard amenities.
- Identify bathroom cabinet varieties.
- Distinguish between modular and custom cabinets, and identify options available to both types.
- Describe how kitchens, bathrooms, and laundry rooms are designed differently for an individual with a disability.
- Identify the basic configurations of cabinet elevation drawings, as well as known methods of keying elevations to floor plans.
- Cite the advantages of using CADD to produce cabinet elevations.

Chapter 25 - Framing Methods

Time Estimated: 1-2 Contact hours

Chapter Objectives

- Identify the four most common materials used in the construction of residential and commercial building: wood, steel, masonry, and concrete.
- Cite the three common framing systems used with wood construction: balloon, platform, and post-and-beam.
- Compare and contrast balloon and platform framing systems, citing the major advantages and disadvantages of each.
- List and describe the general components of the platform system and how they are erected.
- Identify the principles and components of advanced framing techniques (aft).
- Describe the concepts, components, advantages and disadvantages of post-and-beam framing and timber constructions.
- Cite the advantages of steel framing.
- Describe the four classifications of concrete masonry unit (CMU) construction, generally describe how it is reinforced
- Know areas of the country where it is commonly used.
- Identify the typical width of a mortar joint.
- Define basic brick-laying terms, and name and describe insulation and reinforcement options.
- Describe masonry veneer construction.
- Describe techniques used for insulated concrete foam construction and its advantages compared to traditional concrete masonry construction.
- Explain the concept of modular framing methods.

Chapter 26 - Structural Components

Time Estimated: 3 Contact hours

Chapter Objectives

- Discuss how conventional joist and post-and-beam are the two common methods of floor framing, and how the framing crew size and shape of the ground affect the framing method.
- Identify conventional floor framing components and know their typical sizes and spacing.
- Compare and contrast wood, engineered wood, laminated veneer lumber (LVL), and steel girders, flitch beams, and glue-lams.
- Explain the function of wood posts and steel columns in floor framing.
- Compare and contrast conventional floor joists, open web floor joists, I-joists, and laminate veneer lumber (LVL).
- Define cantilever.
- State methods of bracing floor joists.
- Articulate the function of a diagram.
- Cite typical floor sheathing materials, interpret a span rating, and list materials typically used for underlayments.
- Identify basic components of a post-and-beam floor system, as well as know their typical sizes and spacing.
- Distinguish between bearing and non-bearing walls.
- Name the basic components of wall framing, and know their typical sizes and spacing.
- Differentiate between double- and single-wall construction.
- Define shear panel and let-in bracing.
- Describe and name the framing members used to frame wall openings.

- Identify and explain framing terms common to both conventional and trussed roofs.
- Define the basic members of conventionally framed roofs, as well as know typical sizes and spacing.
- Describe methods that can be used to keep rafters from splaying.
- Contrast vaulted roof framing from standard roof/ceiling systems
- Recognize the framing members used to frame roof openings.
- Define truss, enumerate the normal range of residential spans, name typical truss materials, know basic terminology, and specify which members are typically in tension or compression.
- Describe how trusses are secured to bearing points.
- Identify basic truss types.
- Explain the role of metal hangers.
- Cite common building products containing formaldehyde-based resins and solvents, as well as appliances that can cause indoor pollution.
- Identify methods of reducing indoor pollution.

Chapter 27 - Sizing Joists and Rafters Using Span Tables

Time Estimated: 1-2 Contact hours

Chapter Objectives

- Differentiate between dead, live, and dynamic loads.
- Cite the sources of dead loads.
- Distinguish between various live loads, including floor, moving, roof, and snow live loads.
- Identify wind and seismic activity as the dynamic loads, understand how they act on buildings, and delineate how structures are designed to resist stress induced by such loading.
- Explain why building loads are calculated starting from the roof and working down to the foundation.
- Describe how loads are distributed through beams, floors, roofs, ceilings, walls, and foundations.

Chapter 28 - Sizing Joists and Rafters Using Span Tables

Time Estimated: 1-2 Contact hours

Chapter Objectives

- Cite the common spacing of repetitive structural members.
- Identify the two primary factors needed to use span tables.
- Recognize the symbol of fiber-bending stress used in the span tables, and know that it represents the safe, allowable limits for that stress.
- Define the modulus of elasticity.
- Identify common abbreviations for frequently used wood species and grade marking, and know the factors and values needed to use the span tables.
- Identify the purpose of the following table headings: the title, the loads, listed values, and size and spacing of lumber.
- Use span tables as a base, implement the procedures outlined in the text to size floor joists, ceiling joists, and rafters.

Chapter 29 - Determining Simple Beams

Time Estimated: 2 Contact hours

Chapter Objectives

- Distinguish between uniform and concentrated loads.
- Describe a cantilevered beam.
- Identify the common properties associated with the properties of lumber.
- Differentiate between nominal and net sizes of structural lumber.
- Describe the characteristics of dimension lumber and timbers.
- Enumerate and describe the five different ways beams react to loading, including deflection, horizontal shear, vertical shear, tension, and compression.
- Describe the effects a force parallel to the grain has on lumber.
- Describe the effects a force perpendicular to the grain has on lumber.
- Use the appropriate formulas to calculate bending moment, deflection, horizontal shearing, and vertical shearing.
- Define and describe tributary width as it relates to floor joists.
- Explain the effects each of the factors has on beam design: repetitive use, load duration, moisture and temperature content, shear stress
- Identify the four methods of beam design used by professionals.
- Identify the meaning of various structural symbols and notations.
- Determine the area supported by a beam.
- Distinguish between linear and total weight.
- Define and determine reactions for symmetrically-loaded simple beams.
- State typical load-bearing values for both concrete and soils and know how to determine the minimum size of a pier using these values.
- Determine the maximum moment and requisite section modulus of a uniformly-loaded beam.
- Determine the horizontal shear of a beam.
- Determine the deflection of a beam, and cite the deflection limits for floors, ceilings, and rafters.
- Use span tables to size hand sawn or glue-lam beam.
- Use formulas outlined in this chapter to determine the load and sizing requirements of simple beams with concentrated loads, as well as cantilevered beams with either a uniform or concentrated load.

Chapter 30 - Drawing Framing Plans

Time Estimated: 2-3 Contact hours

Chapter Objectives

- Specify which architectural or structural drawing is used to place information on floor framing, upper floor framing, ceiling framing, and conventional and trussed roofs.
- Cite the drawing conventions for indicating the location of headers, beams, posts, joists, and trusses.
- Cite the methods for indicating shear panels, metal straps and ties, let-in bracing, angles, and blocking for diaphragm designs.
- Utilize the IRC to assist in designing prescriptive paths for brace wall panels, alternative braced wall panels, and portal frames.
- Identify the guidelines for the placement of wall reinforcements when lateral bracing is needed.
- Delineate dimensioning, note placement, and section referencing procedures.

- Contrast the requirements and procedures for drafting framing plans for various types of construction.
- Utilize the procedures discussed in the chapter for drawing the conventional and trussed versions of gable, hip, and Dutch hip roof framing plans.
- Utilize the procedures outlined in the chapter for drawing floor-framing plans.

Chapter 31 - Foundation Systems

Time Estimated: 3 Contact hours

Chapter Objectives

- Describe the basic load stresses resisted by foundation.
- Explain how the bearing capacity of soil depends on its composition and moisture content.
- Cite the four common soil classifications, and identify those suitable for construction.
- Describe the three major methods used to compact fill material.
- Discuss the danger of ground freezing, and identify how foundation depths are altered to mitigate its effect.
- Delineate the consequences of water content in soil, understand heaving, and describe how foundation wall pressure can be reduced with proper drainage.
- Cite methods of reducing the radon levels and the causes of radon in a home.
- Explain how, where, and why pilings are used in foundation design.
- Describe continuous or spread foundations, understand how and why concrete is reinforced. Explain conventions for identifying rebar, and clarify the function of keyways.
- Understand conventions for drafting grade beams.
- Distinguish between footings used for fireplaces, masonry veneers, and common foundation walls.
- Cite minimum dimension for foundation walls, materials used in their fabrication, and techniques used to manage slopes.
- Describe the function of mudsills, identify systems for mitigating termite and water damage to them, and specify anchor bolt requirements.
- Explain foundation wall details including venting, beam pockets and supports, crawl space requirements, and insulation methodologies.
- Describe retaining walls and cite their typical dimensions.
- Delineate the basic design of treated wood basement walls.
- Compare and contrast restraining and retaining walls according to their design and function.
- Identify the construction and drafting conventions of pier design.
- State the function of metal foundation connectors.
- Utilize dimensioning methods when dimensioning foundation plans.

Chapter 32 - Floor Systems and Foundation Support

Time Estimated: 1-2 Contact hours

Chapter Objectives

- Describe the advantage of slab-on-grade foundations, define monolithic construction, know the minimum slab thickness, and understand its structural limitation.
- Distinguish between control, construction, and isolation joints.
- Discuss the ramification of placing slabs above, below, or at grade.

- Cite requisite site preparation for slabs-on-grade, including typical minimum grading and compacted fill requirements.
- Recognize the difference between welded wire mesh and reinforcing bars (rebar), know typical destinations for both, explain minimum coverage requirements, and know how they are indicated on working drawings.
- Identify how and why slabs may require protection from ground moisture.
- Describe how slabs are insulated, and know how plumbing and heating, as well as floor elevation changes are indicated on plans.
- Specify minimum crawl space dimensions.
- Identify basic components, sizes and spacing for joist (stick) and post-and-beam framing.
- Identify which elements are graphically shown in foundation plans and which are specified in slabs-on-grade as well as joist (stick), post-and-beam, and combined framing.

Chapter 33 – Foundation Plan Layout

Time Estimated: 1-2 Contact hours

Chapter Objectives

- Identify the scales typically used for the foundation layout.
- Cite the six stages of foundation layout.
- List the grades of lead used for foundation plans.
- Follow the steps outlined in chapter 33 for the layout of:
 - Concrete slab foundation.
 - Foundation plans with joist construction.
 - Standard foundations with post-and-beam floor system.
 - Foundation plans with a partial basement.
 - Foundation plans with a full basement.
- Use checklists to verify completeness of drawings.
- Describe the process of using CADD to draw foundation plans.

Chapter 34 – Plumbing Plans

Time Estimated: 1 Contact hour

Chapter Objectives

- Cite and differentiate between the three types of sections used in construction documents: full, partial sections, and details.
- Identify the factors that influence the choice of section scales, as well as know the typical scale used to show primary sections.
- Indicate drafting conventions used for showing cutting planes on planes.

Chapter 35 – Section Layout

Time Estimated: 1-2 Contact hours

Chapter Objectives

- Cite and execute the seven major stages of drawing sections:
 - Stage 1: Evaluate needs:* evaluate floor and foundation plans for construction needed in a project and identify the appropriate number of sections.
 - Stage 2: Lay out the section:* follow the procedures for floor, wall, and truss framing.
 - Stage 3: Finished-quality lines—structural members only:* understand the line-weight conventions for structural members shown in section

Stage 4: Drawing finishing materials: use the outlined procedures for drawing finishing materials.

Stage 5: Dimensioning: implement procedures for dimensioning section.

Stage 6: Lettering notes: plan and place appropriate notes for roofs, walls, and upper floors and foundations.

Stage 7: Evaluate your work: verify the quality and completeness of drawings.

- Understand the process and advantages of using CADD for producing section drawings.

Chapter 36 - Alternate Layout Techniques

Time Estimated: 1 Contact hour

Chapter Objectives

- Draw floor/joist foundations
- Draw post-and-beam foundations
- Draw basement with concrete slab
- Draw conventional (stick) roof framing
- Draw vaulted ceilings
- Draw garage/residence sections

Chapter 37 - Stair Construction and Layout

Time Estimated: 2-3 Contact hours

Chapter Objectives

- Define basic terms and requirements used in stair design and construction.
- Determine the rise and run of a stairway.
- Cite enclosure requirements under stairs.
- Implement the procedures outlined to draft straight-run, open, u-shaped, and exterior stairs.
- Use appropriate finished-quality lines for drafting stairs.
- Properly dimension and apply notes to a stair drawing.
- Distinguish between requirements for straight, u-shaped, and exterior stairs.
- Explain how to divide any length into an equal number of sections.
- Demonstrate the process of drafting stairs with CADD.

Chapter 38 - Fireplace Construction and Layout

Time Estimated: 2-3 Contact hours

Chapter Objectives

- Define basic fireplace terminology.
- Cite basic fireplace sizes, including relationships of openings to room size, flue sizes to firebox dimensions, height and width of openings, depth of fireboxes, minimum hearth sizes, and minimum chimney heights above roof surfaces.
- Specify minimum chimney reinforcement and anchoring requirements.
- Explain various methods that can be used to improve the energy efficiency of a fireplace and chimney.
- Implement drafting procedures for fireplace sections and elevations, and use appropriate finished-quality line weights.
- Articulate the process of using CADD to produce fireplace drawings.

Chapter 39 - Presentation Drawings

Time Estimated: 2 Contact hours

Chapter Objectives

- Explain the function of presentation drawings, and differentiate them from working drawings.
- Cite the suitable application for each of the different types of presentation drawings, including renderings, elevations, floor plans, plot plans, and sections.
- Compare and contrast common media used in presentation drawings, including sketch paper, vellum, polyester film, and illustration board.
- Compare and contrast common drawing materials, including graphite ink, colored pencil, felt tip pens, and watercolor.
- Distinguish the graphic effects of freehand and mechanically drawn lines, understand the importance of varied line weights, and explain the consequence of different lettering techniques.
- Articulate methods used to illustrate plants in elevations.
- Describe the process of shading an elevation, including determining the light source and the different methods available for drawing shadows.
- Identify presentation floor and plot plan drawing conventions.
- Describe the value and method of illustrating section presentation drawings.
- Relate the value of using CADD when producing presentation drawings.

Chapter 40 - Perspective Drawing Techniques

Time Estimated: 1-2 Contact hours

Chapter Objectives

- Distinguish between orthographic and perspective projection.
- Compare and contrast one-, two-, and three-point perspectives.
- Define common perspective terms and abbreviations, including ground line (G.L.), horizon line (H.L.), picture plane (P.P.), station point (S.P.), true-height line (T.H.L.), and vanishing point (V.P.).
- Utilize the procedures for drawing both a one- and two-point perspective.
- Describe how CADD can create perspective drawings.

Chapter 41 - Rendering Methods for Perspective Drawings

Time Estimated: 1-2 Contact hours

Chapter Objectives

- Explain how visual depth is enhanced in a drawing, including the use of offsetting lines and varying line weights.
- Cite the common projection angles used to render shadows.
- Know how the geometry of shadows differs when projected onto vertical and horizontal planes.
- Distinguish between shade and shadow, and know how they are rendered differently.
- Describe the geometry of creating reflections in water.
- Explain how glass is best rendered.
- Describe how the textures of common building surfaces are rendered, including roofing materials, siding, and paneling.
- Enumerate objects that constitute entourage, and articulate their significance in a rendering.

- Describe methods of applying plants, people, furnishings and contents, and cars.
- Cite basic graphic rules governing the relationship between a structure and its entourage.
- Plan a rendering and implement the procedures for creating one- and two-point perspective renderings.

Chapter 42 - General Construction Specifications

Time Estimated: 1 Contact hour

Chapter Objectives

- Describe the Descriptions of Materials, who uses it, and understand its legal significance.
- Identify some of the minimum requirements of various construction specification classifications, including:
 - Room dimensions
 - Light and ventilation
 - Foundations
 - Framing
 - Stairways
 - Roof
 - Chimney and fireplace
 - Thermal insulation and heating
 - Fire warning systems.
- Contrast residential from commercial specifications.
- Explain what the CSI Master format is and how it affects the structure of commercial specifications.

Chapter 43 - Construction Supervision Procedures

Time Estimated: 1 Contact hour

Chapter Objectives

- Refer to the FHA-proposal construction appraisal requirements to provide a complete loan application for either a subdivision or individual appraisal.
- Describe the function of a change order and know who needs to approve it.
- Identify the procedure of applying for a building permit, including whose responsibility it is, its purpose, required drawings, and how the building permit fee is generally determined.
- Cite the parties associated with a construction contract, identify some of the elements of the contract including completion date, payment schedule, contract administration, insurance requirements, and termination conditions.
- Distinguish between fixed-sum, lump-sum, and cost-plus contracts: and cite advantages and disadvantages of each.
- Articulate the legal significance of a completion notice.
- Cite the purpose of a bid, as well as factors that influence the selection of a contractor.
- State the two general types of construction inspections and explain the function of each.

Chapter 44 - Building Codes and Commercial Design

Time Estimated: 1-2 Contact hours

Chapter Objectives

- Explain the necessity of working closely with the building code when drafting commercial projects.

- Describe the major facets of a building that the code covers.
- Identify the basic occupancy classifications for the model codes.
- Describe the significance of occupancy groups, know how to determine the group for a given use.
- Explain how different occupancy groups are separated within a building.
- State the impact of a building's siting on construction assemblies.
- Cite and distinguish between the five types of construction.
- Explain how to determine the allowable building area and height.
- Describe the process used to determine the building location and size.
- Explain how to increase the allowable floor area of a structure and its potential impacts.
- Describe the bearing of the occupant load on building design.
- Use the codes to work effectively as a drafter.

Chapter 45 - Common Commercial Construction Materials

Time Estimated: 1 Contact hour

Chapter Objectives

- Describe the use of wood in commercial construction, including conventionally-framed walls and roofs: heavy timber and laminated beam construction.
- Identify how to represent beams and posts, masonry members, concrete block, steel, and wood in commercial drawings.
- Explain the use of concrete block in commercial architecture, cite typical dimensions, know the importance of following a module, and describe how block is reinforced.
- Cite the constituent parts of concrete, as well as the various delivery methods available.
- Describe cast-in-place concrete systems
- Understand the concept of vertical reinforcing and spiral ties and columns.
- Delineate slab construction including with and without steel decking, rib, and waffle systems.
- Describe precast concrete construction, including prestressed and tilt-up systems.
- Distinguish between light-gauge, prefabricated and steel-framed construction, and identify common steel shapes.
- Identify how steel members are specified on a drawing.
- Cite common steel connection methods, including nails, screws, bolts and welds, and common weld names.
- Explain the potential of using CADD for drafting structural details.

Chapter 46 - Commercial Construction Projects

Time Estimated: 1-2 Contact hours

Chapter Objectives

- Describe how commercial projects require different office practices from residential projects.
- Explain the function of *sweet's catalog* in commercial drafting.
- Understand the need to utilize "engineer's calcs," cite the three areas of these calculations.
- Explain the process for calculating building component requirements and how drafters apply them.
- Identify the major differences between commercial and residential floor plans according to the materials used, and the extent to which schedule, notes, and symbols are employed.

- Describe commercial electrical, reflected ceiling, mechanical, plumbing, foundation, roof, plot, grading, and landscape plans, as well as clarify the type of information contained in commercial exterior and interior elevations and sections.
- Describe how CADD can be implemented to prepare commercial project drawings.

Chapter 47 - Structural Drafting

Time Estimated: 1-2 Contact hours

Chapter Objectives

- Plan a drawing by reviewing a building design for similarities, studying details, and by listing questions for the engineer.
- Use engineer's calculations and sketches in preparing working drawings.
- Identify the process of laying out a structural drawing, and identify common media and drawing materials.
- Properly set up and coordinate structural details.
- Implement quality lettering techniques.
- Explain how to resolve conflicts between engineering sketches.
- Use occupancy charts introduced in chapter 44 to determine the least restrictive types of construction possible.

Matrix Breakdown of Chapter Contact Hours

<u>Chapter</u>	<u>Chapter Title</u>	<u>Contact Hours</u>
1	Professional Architectural Careers, Office Practice, and Opportunities	1.5
2	Architectural Drafting Equipment	2.5
3	Drafting Media and Reproduction Methods	1.0
4	Sketching and Orthographic Projection	1.5
5	Architectural Lines and Lettering	1.5
6	Computer-Aided Design and Drafting in Architecture	1.5
7	Building Codes and Interior Design	2.5
8	Room Relationships and Sizes	2.5
9	Exterior Design Factors	2.5
10	Energy-Efficient Design and Construction	3.0
11	Site Orientation	1.5
12	Legal Descriptions and Plot Plan Requirements	2.0
13	Site Plan Layout	1.5
14	Floor-Plan Symbols	2.0
15	Floor-Plan Dimensions	3.0
16	Floor-plan Layout	5.0
17	Electrical Plans	3.5
18	Plumbing Plans	3.0
19	Heating, Ventilation, and Air Conditioning	3.0
20	Roof Plan Components	1.5
21	Roof Plan Layout	2.5
22	Introduction to Elevations	1.5
23	Elevation Layout and Drawing Techniques	1.5
24	Mill and Cabinet Technology, Cabinet Elevations, and Layout	2.5
25	Framing Methods	1.5
26	Structural Components	3.0
27	Design Criteria for Structural Loading	1.5
28	Sizing Joists and Rafters Using Span Tables	1.5
29	Determining Simple Beams	2.0
30	Drawing Framing Plans	2.5
31	Foundation Systems	3.0
32	Floor Systems and Foundation Support	1.5
33	Foundation Plan Layout	1.5
34	Sectioning Basics	1.0
35	Section Layout	1.5
36	Alternate Layout Techniques	1.0
37	Stair Construction and Layout	2.5
38	Fireplace Construction and Layout	2.5
39	Presentation Drawings	2.0
40	Perspective Drawing Techniques	1.5
41	Rendering Methods for Perspective Drawings	1.5
42	General Construction Specifications	1.0
43	Construction Supervision Procedures	1.0
44	Building Codes and Commercial Design	1.5
45	Common Commercial Construction Materials	1.0
46	Commercial Construction Projects	1.5
47	Structural Drafting	1.5
Total Hours		93

The contact hours listed above only for estimation purposes only. Instructors are encouraged to develop a course syllabus based on their own instructional practices.