



8648

ADVANCED ARCHITECTURAL
DESIGN DRAFTING (12B)

40S/40E/40M

A Design Drafting Course

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Course Description

Advanced Architectural Design Drafting is intended for students in the transition phase of architectural design drafting.

Curriculum content provides for an overview of residential building systems. Students will present their design solutions to others.

Topics include the following:

- drafting and construction standards
- building materials and systems (e.g., foundation, electrical, HVAC)
- architectural technical drawings, including foundation, electrical, HVAC, and site plans, and section and detail drawings
- civil engineering concepts (structural, topographical)

Students will apply safety procedures and employability skills independently. Students will continue to develop their knowledge, skills, and attitudes in the areas of career development, sustainability, and new and emerging technologies in architectural design drafting.

Cross-curricular learning outcomes, which include those in design drafting math, science, and the interpretation of technical documents, are to be integrated into the course.

The learning outcomes are organized by Technology Fundamentals (F), Technology Skills (S), and Professional Practice (P) strands. For instructional purposes, the sequence of learning outcomes and the learning outcomes included in each unit of study can vary based on the projects within the course.

Goal 1: Solve problems using the **design process.**

GLO 1.1: Define design problems.

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| SLO 12B.F.1.1.1 | Describe the relationship between the design process and the creation and revision of construction documents. |
| SLO 12B.F.1.1.2 | Define design problems related to building systems (e.g., electrical, HVAC, site plan, wall systems). |
| SLO 12B.S.1.1.1 | Use a structured model in the creation, refining, and revision of architectural drawings. |
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GLO 1.2: Research and analyze verbal and numeric **information** for design solutions.

- SLO 12B.F.1.2.1 Examine the impacts of building systems on architectural design.
 - SLO 12B.F.1.2.2 Consider building processes, material types and availability, costs, and the building code's influence on design.
 - SLO 12B.F.1.2.3 Compare various sustainable architectural building systems (e.g., HVAC, plumbing, electrical).
 - SLO 12B.F.1.2.4 Identify additional universal design principles.
 - SLO 12B.F.1.2.5 Consider aesthetic principles in relation to building systems and site planning.
 - SLO 12B.F.1.2.6 Investigate the historic trends in urban design.
 - SLO 12B.S.1.2.1 Create and revise sketches and notes based on building system research.
 - SLO 12B.S.1.2.2 Extract site data using surveying devices.
 - SLO 12B.S.1.2.3 Incorporate architectural aesthetic principles, sustainable concepts, and universal design principles into design solutions.
 - SLO 12B.S.1.2.4 Research sizes of appropriate structural members (e.g., nominal lumber, steel, truss joists, glulam).
 - SLO 12B.S.1.2.5 Analyze and predict consequences of design modifications.
 - SLO 12B.S.1.2.6 Research and reference information for residential building systems from various sources, including building codes, span tables, manufacturers' specifications, and site data.
 - SLO 12B.S.1.2.7 Research existing site conditions.
 - SLO 12B.S.1.2.8 Produce a drawing typical of civil engineering.
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GLO 1.3: Synthesize information and ideas to create design solutions.

- SLO 12B.F.1.3.1 Identify influences (e.g., cost, materials, sustainability) that can impact the decision-making process for architectural design solutions.
- SLO 12B.F.1.3.2 Identify sketching techniques related to specialized media (e.g., charcoal, paint, felt pen, pen and ink).
- SLO 12B.F.1.3.3 Identify timeline management techniques.
- SLO 12B.S.1.3.1 Apply building systems to design solutions.
- SLO 12B.S.1.3.2 Select building systems (e.g., HVAC, plumbing, electrical) based on research.

- SLO 12B.S.1.3.3 Create freehand sketches to solve architectural design problems.
- SLO 12B.S.1.3.4 Select appropriate and cost-effective solutions to civil engineering problems.
- SLO 12B.S.1.3.5 Produce a site-development proposal.

Goal 2: Communicate design solutions.

GLO 2.1: Prepare **computer models** of design solutions.

- SLO 12B.F.2.1.1 Describe the function of computer models (e.g., visualization, model to working drawing).
- SLO 12B.F.2.1.2 Describe the process of creating building systems using CADD software.
- SLO 12B.S.2.1.1 Modify computer models using building system components and standard parts.
- SLO 12B.S.2.1.2 Use a computer model for visualization and to create working drawings, including foundation, electrical, HVAC, and site plan drawings, and section (e.g., building and wall) and detail drawings.
- SLO 12B.S.2.1.3 Identify existing site conditions.
- SLO 12B.S.2.1.4 Identify structures within a site.
- SLO 12B.S.2.1.5 Include utilities locations.

GLO 2.2: Prepare working and presentation drawings and documents.

Layout (F)

- SLO 12B.F.2.2.1 Identify architectural scales and revision columns for an architectural drawing.
- SLO 12B.F.2.2.2 Identify architectural symbols (e.g., building and wall) for foundation, electrical, HVAC, and site plan drawings, and section and detail drawings.
- SLO 12B.F.2.2.3 Locate a residence on a site.
- SLO 12B.F.2.2.4 Describe layout considerations (e.g., codes, function, aesthetics) for electrical and mechanical equipment.

Line Work (F)

- SLO 12B.F.2.2.5 Identify architectural line types (e.g., object, hidden, centre, construction, extension, and dimension lines, break lines, phantom lines, hatch lines) and their intended use.

Dimensioning and Annotating (F)

- SLO 12B.F.2.2.6 Identify architectural dimensioning and annotation standards.
- SLO 12B.F.2.2.7 Describe and apply civil engineering/surveying units.
- SLO 12B.F.2.2.8 Describe surveying terminology and techniques.

Layout (S)

- SLO 12B.S.2.2.1 Use the components (e.g., title blocks, border, sheet sizes, sheet layout, architectural scales, revision columns) of an architectural drawing.
- SLO 12B.S.2.2.2 Create working drawings, including foundation, electrical, HVAC, and site plan drawings, and section (e.g., building and wall) and detail drawings using architectural symbols to industry standard.
- SLO 12B.S.2.2.3 Create schedule tables (e.g., electrical, plumbing).
- SLO 12B.S.2.2.4 Revise drawings to ensure consistency, and organize and assemble a set of working drawings.

Line Work (S)

- SLO 12B.S.2.2.5 Select and use line types for architectural applications based on standards.

Dimensioning and Annotating (S)

- SLO 12B.S.2.2.6 Use industry standard dimensions and annotations.

Goal 3: Use appropriate **materials and processes** of building/manufacturing.

GLO 3.1: Describe **materials** used in design solutions.

- SLO 12B.F.3.1.1 Identify materials and equipment used for building systems.
- SLO 12B.F.3.1.2 Identify material and equipment estimation techniques.
- SLO 12B.S.3.1.1 Select materials, components, and equipment for building systems.
- SLO 12B.S.3.1.2 Generate materials lists for building systems.

GLO 3.2: Describe **building/manufacturing processes** used in design solutions.

- SLO 12B.F.3.2.1 Identify and describe residential construction methods and principles for building systems.
- SLO 12B.F.3.2.2 Demonstrate an awareness of residential project management.

Goal 4: Present design solutions.**GLO 4.1: Plan and organize presentations** of design solutions.

- SLO 12B.F.4.1.1 Identify methods for presenting building systems.
 - SLO 12B.S.4.1.1 Select presentation methods for building systems (e.g., oral, written, overlay graphic, physical or digital 3-D model).
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GLO 4.2: Use presentation production methods.

- SLO 12B.F.4.2.1 Differentiate among the formats and functions of technical reports, design briefs, and scope-of-work documents.
 - SLO 12B.F.4.2.2 Differentiate among the formats and functions of visual presentation formats (e.g., presentation software, presentation sections, detailed views, physical models) for building systems.
 - SLO 12B.S.4.2.1 Create written technical reports and scope-of-work documents supporting choice and placement of building systems.
 - SLO 12B.S.4.2.2 Create visual presentations supporting choice and placement of building systems.
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GLO 4.3: Present/defend design solutions.

- SLO 12B.F.4.3.1 Describe elements and communication techniques (e.g., appearance and dress, enunciation and volume, body language) of presentations for technical information.
 - SLO 12B.F.4.3.2 Discuss out-of-school student competitions related to architectural design drafting.
 - SLO 12B.S.4.3.1 Present technical design solutions to an audience (e.g., group), including the civil engineering components, and respond to questions and feedback.
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Goal 5: Describe and apply the common tools and equipment used in design drafting.**GLO 5.1: Describe and use drawing and modelling tools and equipment.**

- SLO 12B.F.5.1.1 Identify surveying tools and equipment.
- SLO 12B.S.5.1.1 Use surveying tools and equipment.
- SLO 12B.S.5.1.2 Use sketching tools and media.

- SLO 12B.S.5.1.3 Use physical modelling tools (e.g., scissors, knives, saws).
 - SLO 12B.S.5.1.4 Use measuring devices (e.g., rulers, tape measures, architectural and metric scales, calipers).
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GLO 5.2: Describe and use **computer hardware and equipment**.

- SLO 12B.F.5.2.1 Identify function and use of rapid prototyping and 3-D scanning equipment.
 - SLO 12B.S.5.2.1 Operate input devices (e.g., digital camera, scanner, 3-D scanner).
 - SLO 12B.S.5.2.2 Operate output devices (e.g., printers, plotters, rapid prototyping).
 - SLO 12B.S.5.2.3 Troubleshoot computer and printer/plotter problems.
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GLO 5.3: Describe and use **software**.

- SLO 12B.F.5.3.1 Identify building system-specific software.
- SLO 12B.F.5.3.2 Discuss the application of office software in the design and presentation process.
- SLO 12B.S.5.3.1 Use industry standard architectural CADD software.
- SLO 12B.S.5.3.2 Use office- and design-related software.
- SLO 12B.S.5.3.3 Manage project data using CADD software.
- SLO 12B.S.5.3.4 Manage and organize project files.
- SLO 12B.S.5.3.5 Use and manipulate digital images to obtain and record information (e.g., portfolio collection, research).
- SLO 12B.S.5.3.6 Use information communication technologies (e.g., RSS feeds, blogs, technical websites, discussion boards) related to architectural design drafting.

Goal 6: Describe and apply transferable **cross-curricular knowledge and skills** that relate to design drafting.

GLO 6.1: Describe and apply **mathematical concepts** as they relate to design drafting.

- SLO 12B.F.6.1.1 Identify standard drafting scales for technical drawings.
- SLO 12B.F.6.1.2 Identify the buildable levels of precision used in architectural drawings.
- SLO 12B.F.6.1.3 Identify mathematical concepts (e.g., slope, ratio, proportion, angles) related to architectural drafting.
- SLO 12B.S.6.1.1 Apply slope, ratio, and proportion, and trigonometric and algebraic principles to solve architectural and civil engineering construction problems.

- SLO 12B.S.6.1.2 Convert survey measurements to architectural measurements.
 - SLO 12B.S.6.1.3 Research and calculate sizes of structural members (e.g., nominal lumber, steel, truss joists, glulam).
 - SLO 12B.S.6.1.4 Calculate volume for the sizing of HVAC systems (e.g., duct sizes, room volumes, window area).
 - SLO 12B.S.6.1.5 Calculate heating and cooling requirements.
 - SLO 12B.S.6.1.6 Estimate material, equipment, and labour costs.
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GLO 6.2: Read, interpret, and communicate information.

- SLO 12B.F.6.2.1 Identify sources of technical information (e.g., building code, material and equipment specifications, span tables).
 - SLO 12B.S.6.2.1 Organize and record technical information from oral, visual, material, print, or electronic sources.
 - SLO 12B.S.6.2.2 Read, interpret, and apply technical information from text, tables, charts, and graphs.
 - SLO 12B.S.6.2.4 Communicate using the language and terminology of architectural design drafting.
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GLO 6.3: Understand scientific concepts as they apply to design drafting.

- SLO 12B.F.6.3.1 Identify the scientific properties of materials used in architectural design solutions (e.g., strength, fire rating, properties of concrete, resistance to insect damage and decay, shrinkage, expansion).
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Goal 7: Demonstrate an awareness of sustainability as it pertains to design drafting.

GLO 7.1: Understand the impact of architectural/engineering design on the environment.

- SLO 12B.F.7.1.1 Identify sustainable materials and building systems that affect architectural design solutions (e.g., electrical conservation, green construction, water conservation, cradle to cradle, alternative energy).
- SLO 12B.F.7.1.2 Differentiate between traditional and sustainable building systems and their impacts on the environment.
- SLO 12B.F.7.1.3 Examine energy inventory for residential construction.
- SLO 12B.S.7.1.1 Incorporate sustainable materials and building systems in architectural design solutions.

SLO 12B.S.7.1.2 Use energy inventory software to calculate residential energy efficiency.

GLO 7.2: Describe the impact of architectural/engineering design on **human health and well-being**.

SLO 12B.F.7.2.1 Identify human health and well-being sustainable materials and building systems that affect architectural design solutions (e.g., light quality, air quality, occupant safety, surface finishes, off-gassing).

SLO 12B.F.7.2.2 Differentiate among various natural and synthetic materials, and sustainable building systems and their impact on human health and well-being.

SLO 12B.S.7.2.1 Incorporate human health and well-being sustainable materials and building systems in architectural design solutions.

GLO 7.3: Recognize the **economic impact** of sustainable practices in architectural/engineering design.

SLO 12B.F.7.3.1 Identify economic sustainable materials and building systems that affect architectural design solutions (e.g., solar, geothermal, wind, hydroelectric, renewable materials).

SLO 12B.F.7.3.2 Differentiate between traditional and sustainable building systems and their economic impacts.

SLO 12B.F.7.3.3 Identify sustainable site development practices.

SLO 12B.S.7.3.1 Incorporate economic sustainable materials and building systems in architectural design solutions.

Goal 8: Understand the **evolution** of design drafting, including its **technological progression and emerging trends**.

GLO 8.1: Describe the **evolution of design drafting, including its technological progression and emerging trends**.

SLO 12B.F.8.1.1 Discuss emerging trends related to the role of designer/draftsperson and the use of construction documents in building.

SLO 12B.F.8.1.2 Describe emerging styles and trends and their impact on the selection of materials and building systems.

Goal 9: Follow the **ethical and legal standards** in design drafting.

GLO 9.1: Incorporate the local and national **building codes and standards as well as manufacturing and engineering standards** into designs.

- SLO 12B.P.9.1.1 Identify the commonly used standards for architectural drafting.
 - SLO 12B.P.9.1.2 Produce technical drawings to CAN/CSA, ISO, and ANSI standards.
 - SLO 12B.P.9.1.3 Follow building codes to create working drawings including foundation, electrical, HVAC, and site plan drawings, and section (e.g., building and wall) and detail drawings.
 - SLO 12B.P.9.1.4 Use CADD standards (e.g., discipline specific, trade specific, organization) based on design project requirements.
 - SLO 12B.P.9.1.5 Describe the legal (e.g., permits, bylaws, building code, covenants) and contractual (e.g., contractor, material supplies) obligations of drawings.
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GLO 9.2: Describe the **ethical expectations** of designers.

- SLO 12B.P.9.2.1 Consider the ethical implications of compromise in making technical design decisions (e.g., costs, inadequate design).
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Goal 10: Demonstrate a knowledge of and ability to recognize and apply appropriate **health and safety** requirements and practices to maintain a safe workplace.

GLO 10.1: Demonstrate an awareness of **rights, responsibilities, and safety procedures** for specific tools, equipment, and working environments.

- SLO 12B.P.10.1.1 Demonstrate and value safe work practices and procedures.
- SLO 12B.P.10.1.2 Follow proper classroom practices (e.g., keep work area clean and organized, avoid horseplay, clean keyboards with sanitizer), which help protect the safety and health of students and staff.
- SLO 12B.P.10.1.3 Demonstrate ergonomically correct procedures to avoid injury (e.g., stress, strain).
- SLO 12B.P.10.1.4 Demonstrate personal responsibility for health and safety.

- SLO 12B.P.10.1.5 Demonstrate the safety features of tools and equipment.
 - SLO 12B.P.10.1.6 Follow emergency evacuation procedures.
 - SLO 12B.P.10.1.7 Use appropriate aids to minimize risk of injury.
 - SLO 12B.P.10.1.8 Use appropriate personal protective equipment.
 - SLO 12B.P.10.1.9 Locate first aid stations and fire extinguishers.
 - SLO 12B.P.10.1.10 Demonstrate an awareness of external health and safety programs and certifications.
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GLO 10.2: Describe **health and safety laws and regulations**.

- SLO 12B.P.10.2.1 Describe the reporting process for injuries.
 - SLO 12B.P.10.2.2 Identify WHMIS symbols and terminology, and follow WHMIS guidelines, including the location of MSDS sheets.
 - SLO 12B.P.10.2.3 Comply with health and safety legislation and practices.
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Goal 11: Demonstrate **employability skills** required in design drafting.

GLO 11.1: Demonstrate fundamental **employability skills**.

- SLO 12B.P.11.1.1 Describe the importance of employability skills in school, work, and daily life.
 - SLO 12B.P.11.1.2 Listen and ask questions to clarify problems and instructions.
 - SLO 12B.P.11.1.3 Locate, gather, and organize design drafting information using appropriate technology and information systems.
 - SLO 12B.P.11.1.4 Assess situations and identify problems and possible solutions.
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GLO 11.2: Demonstrate **personal management** skills.

- SLO 12B.P.11.2.1 Demonstrate interest, initiative, and effort.
 - SLO 12B.P.11.2.2 Manage time to complete tasks/projects within stated time frames.
 - SLO 12B.P.11.2.3 Demonstrate accountability for own actions and for the actions of one's team.
 - SLO 12B.P.11.2.4 Respond constructively to changes.
 - SLO 12B.P.11.2.5 Demonstrate a willingness to learn continuously.
 - SLO 12B.P.11.2.6 Appreciate the need for continuous learning in technologically dependent occupations.
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GLO 11.3: Demonstrate **teamwork** skills.

- SLO 12B.P.11.3.1 Be respectful toward, open to, and supportive of the thoughts, opinions, and contributions of others in a group.
- SLO 12B.P.11.3.2 Contribute information and skills to achieve the goals of a group.
- SLO 12B.P.11.3.3 Contribute willingly to classroom/shop learning activities.
- SLO 12B.P.11.3.4 Accept assistance from and offer it to others.

Goal 12: Describe **career opportunities** in design drafting.

GLO 12.1: Describe **post-secondary opportunities** related to design drafting.

- SLO 12B.P.12.1.1 Identify industry and association certifications related to architectural design drafting.

GLO 12.2: Describe **career opportunities** available in design drafting across industries.

- SLO 12B.P.12.2.1 Explore architectural careers related to the residential construction industry.
- SLO 12B.P.12.2.2 Identify information for transition from school to work.

GLO 12.3: Create, maintain, and present a **portfolio**.

- SLO 12B.P.12.3.1 Organize and reflect on architectural samples for inclusion in a design drafting portfolio.
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