



8435

DESIGN DRAFTING
ESSENTIALS 1 (10)

20S/20E/20M

A Design Drafting Course

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Course Description

Design Drafting Essentials 1 is intended for students wishing to explore architectural/engineering design drafting.

Curriculum content focuses on an introduction to architectural/engineering design drafting. The emphasis will be on project-based activities. Students will present their design solutions to others.

Topics include the following:

- freehand sketching
- principles of design
- drafting standards
- materials and processes
- computer modelling
- architectural/engineering basics

The course includes an introduction to safety, employability skills, career development, sustainability, and new and emerging technologies in 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 10.F.1.1.1 | Identify a structured model to solve basic problems. |
| SLO 10.F.1.1.2 | Identify design problems. |
| SLO 10.S.1.1.1 | Use a structured model to solve architectural/engineering problems. |

GLO 1.2: Research and analyze verbal and numeric **information** for design solutions.

- SLO 10.F.1.2.1 Demonstrate an awareness of architectural design principles (e.g., work triangle, bathroom design, circulation).
 - SLO 10.F.1.2.2 Demonstrate an awareness of engineering design principles (e.g., physical properties, fits, mechanical principles).
 - SLO 10.F.1.2.3 Identify factors (e.g., materials, cost, manufacturing processes) that influence design.
 - SLO 10.F.1.2.4 Discuss sustainability as it relates to design (e.g., materials used, social impact).
 - SLO 10.F.1.2.5 Discuss universal design.
 - SLO 10.F.1.2.6 Discuss aesthetic principles.
 - SLO 10.F.1.2.7 Identify common research methods used in design.
 - SLO 10.S.1.2.1 Follow architectural design principles (e.g., work triangle, bathroom design, circulation) for design solutions.
 - SLO 10.S.1.2.2 Follow engineering design principles (e.g., physical properties, fits, mechanical principles).
 - SLO 10.S.1.2.3 Research information to solve design problems.
 - SLO 10.S.1.2.4 Include sustainable concepts in designs.
 - SLO 10.S.1.2.5 Include universal design in solutions.
 - SLO 10.S.1.2.6 Include aesthetic principles in designs.
 - SLO 10.S.1.2.7 Identify possible solutions for design problems.
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GLO 1.3: Synthesize information and ideas to create design solutions.

- SLO 10.F.1.3.1 Identify influences that can impact the decision-making process for design solutions.
- SLO 10.F.1.3.2 Identify techniques used for 2-D and isometric sketching.
- SLO 10.S.1.3.1 Select design solutions based on provided criteria and related research.
- SLO 10.S.1.3.2 Create freehand sketches to solve architectural and engineering design problems.

Goal 2: Communicate design solutions.

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

- SLO 10.F.2.1.1 Identify the function of computer models (e.g., visualization, model to working drawing, assembly).
 - SLO 10.F.2.1.2 Define basic geometric construction principles (e.g., linear, angular, perpendicular, parallel, tangential).
 - SLO 10.F.2.1.3 Identify basic architectural components, including walls, doors, windows, built-ins, fixtures, and stairs.
 - SLO 10.F.2.1.4 Identify basic engineering features of parts (e.g., fillets, chamfers, holes).
 - SLO 10.S.2.1.1 Create basic architectural and engineering models of design solutions.
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GLO 2.2: Prepare working and presentation drawings and documents.

- SLO 10.F.2.2.1 Identify the differences between working and presentation drawings.

Layout (F)

- SLO 10.F.2.2.2 Identify components (e.g., title blocks, border, sheet sizes, sheet layout, architectural scales) of an architectural drawing.
- SLO 10.F.2.2.3 Identify the components (e.g., title block information, border with zones, view arrangements, engineering scale) of an engineering drawing.
- SLO 10.F.2.2.4 Identify architectural symbols (e.g., walls, doors, windows, built-ins, fixtures, stairs) for floor plans.
- SLO 10.F.2.2.5 Identify basic engineering symbols (e.g., fillets, chamfers, holes) for orthographic projection drawings.

Line Work (F)

- SLO 10.F.2.2.6 Identify basic architectural line types (e.g., object, hidden, centre, construction, extension, dimension lines) and their intended uses (e.g., walls, doors, windows, built-ins, fixtures, stairs).
- SLO 10.F.2.2.7 Identify basic engineering line types (e.g., object, hidden, centre, construction, extension, dimension, leader lines) and their intended uses (e.g., fillets, chamfers, holes).

Dimensioning and Annotating (F)

- SLO 10.F.2.2.8 Identify dimensioning standards.
- SLO 10.F.2.2.9 Identify the purpose of notes and annotations (e.g., about materials, processes, finishes) in architectural and engineering drawings.

Layout (S)

- SLO 10.S.2.2.1 Use the components (e.g., title blocks, border, sheet sizes, sheet layout, architectural scales) of an architectural drawing.
- SLO 10.S.2.2.2 Use the components (e.g., title block information, border with zones, view arrangements, engineering scale) of an engineering drawing.
- SLO 10.S.2.2.3 Create floor plans using architectural symbols (e.g., walls, doors, windows, built-ins, fixtures, stairs).
- SLO 10.S.2.2.4 Create orthographic projection drawings using basic engineering symbols.
- SLO 10.S.2.2.5 Apply basic geometric construction principles (e.g., linear, angular, perpendicular, parallel, tangential).

Line Work (S)

- SLO 10.S.2.2.6 Select and use basic line types for architectural and engineering applications.

Dimensioning and Annotating (S)

- SLO 10.S.2.2.7 Apply placement, styles, and rules of dimensioning following dimensioning standards.
- SLO 10.S.2.2.8 Apply the placement, style, size of text, and leaders for notes and abbreviations following standards.

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

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

- SLO 10.F.3.1.1 Describe the materials used in design solutions.
- SLO 10.S.3.1.1 List materials used in design solutions.
- SLO 10.S.3.1.2 Include materials notes in drawings.

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

- SLO 10.F.3.2.1 Demonstrate an awareness of the construction process.
- SLO 10.F.3.2.2 Demonstrate an awareness of the manufacturing process.

Goal 4: Present design solutions.

GLO 4.1: Plan and organize presentations of design solutions.

- SLO 10.F.4.1.1 Identify presentation methods (e.g., design briefs, sketches, drawings).

- SLO 10.F.4.1.2 Identify the rationale for presentations in the design process.
 - SLO 10.S.4.1.1 Follow presentation methods (e.g., oral, written, graphic, 3-D model).
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GLO 4.2: Use presentation production methods.

- SLO 10.F.4.2.1 Identify the elements (e.g., rationale, functionality, research) of a design brief.
 - SLO 10.F.4.2.2 Identify the function of 3-D models as presentation methods.
 - SLO 10.S.4.2.1 Create design briefs to support design solutions.
 - SLO 10.S.4.2.2 Create shaded 3-D computer models.
 - SLO 10.S.4.2.3 Create physical models.
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GLO 4.3: Present/defend design solutions.

- SLO 10.F.4.3.1 Identify elements (e.g., clarity, conciseness) of effective verbal communication.
 - SLO 10.F.4.3.2 Demonstrate an awareness of competitions related to design drafting.
 - SLO 10.S.4.3.1 Present design solutions to an audience (e.g., peer, teacher).
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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 10.F.5.1.1 Identify sketching tools and media.
 - SLO 10.F.5.1.2 Identify physical modelling tools (e.g., scissors, knives, saws).
 - SLO 10.F.5.1.3 Identify measuring devices (e.g., rulers, tape measures, engineering, architectural, and metric scales, calipers).
 - SLO 10.S.5.1.1 Use sketching tools and media.
 - SLO 10.S.5.1.2 Use basic physical modelling tools (e.g., scissors, knives, saws, tape measures, calipers).
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GLO 5.2: Describe and use **computer hardware and equipment.**

- SLO 10.F.5.2.1 Identify common computer hardware.
- SLO 10.F.5.2.2 Identify basic hardware problems (e.g., power, cords, device connections).

SLO 10.S.5.2.1 Operate common computer hardware (e.g., three-button mouse, printers, monitors).

GLO 5.3: Describe and use **software**.

- SLO 10.F.5.3.1 Identify industry standard architectural and engineering CADD software.
 - SLO 10.F.5.3.2 Identify office- and design-related software.
 - SLO 10.F.5.3.3 Identify information communication technologies (e.g., architectural and engineering websites) related to design drafting.
 - SLO 10.S.5.3.1 Use industry standard architectural and engineering CADD software.
 - SLO 10.S.5.3.2 Use office- and design-related software.
 - SLO 10.S.5.3.3 Manage and organize project files.
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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 10.F.6.1.1 Demonstrate an understanding of the metric and imperial systems of measurement.
- SLO 10.F.6.1.2 Add, subtract, multiply, and divide fractions, decimals, feet, and inches.
- SLO 10.F.6.1.3 Identify symbols related to imperial measurement (e.g., 2'-3").
- SLO 10.F.6.1.4 Identify equivalent forms of fractions (e.g., $\frac{1}{8}'' = \frac{2}{16}''$, lowest common denominator).
- SLO 10.F.6.1.5 Identify standard drafting scales (e.g., relationship between ratios and fractions).
- SLO 10.F.6.1.6 Relate the Cartesian coordinate system to CADD.
- SLO 10.S.6.1.1 Use architectural units (imperial) and formats of measurement.
- SLO 10.S.6.1.2 Use engineering units (metric) and formats of measurement.
- SLO 10.S.6.1.3 Use ratios for scale drawing.
- SLO 10.S.6.1.4 Extract architectural and engineering data using measuring devices (e.g., rulers, tape measures, scales, calipers).
- SLO 10.S.6.1.5 Calculate the length and area of buildings and individual rooms.

SLO 10.S.6.1.6 Calculate distance, area, and volume for engineered products.

GLO 6.2: Read, interpret, and communicate information.

SLO 10.F.6.2.1 Describe research and evaluation techniques.
SLO 10.F.6.2.2 Identify sources of technical information (e.g., building code, span tables, fastener tables).
SLO 10.S.6.2.1 Find, collect, and evaluate information (text, images, data, audio, and video) from given resources.
SLO 10.S.6.2.2 Communicate using the language and terminology of architectural and engineering design drafting.

GLO 6.3: Understand scientific concepts as they apply to design drafting.

SLO 10.F.6.3.1 Identify the factors that influence architectural and engineering material use (e.g., strength, density, combustibility, buoyancy).
SLO 10.F.6.3.2 Describe strengths of shapes.
SLO 10.F.6.3.3 Appreciate the relationship between the model/drawing and physical object.

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 10.F.7.1.1 Define sustainability as it relates to the environment.
SLO 10.F.7.1.2 Identify environmental sustainability factors that influence architectural and engineering design solutions.

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

SLO 10.F.7.2.1 Define sustainability as it relates to human health and well-being.
SLO 10.F.7.2.2 Identify sustainability factors that influence human health and well-being in architectural and engineering design solutions.

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

SLO 10.F.7.3.1 Define sustainability as it relates to the economy.

SLO 10.F.7.3.2 Identify economic sustainability factors that influence architectural and engineering 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 10.F.8.1.1 Demonstrate an appreciation of traditional design drafting tools, equipment, materials, and drawings.

SLO 10.F.8.1.2 Demonstrate an appreciation of the impact of developing trends and emerging technologies on design drafting.

SLO 10.F.8.1.3 Identify different house styles.

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 10.P.9.1.1 Discuss the need for standards and codes in design drafting.

SLO 10.P.9.1.2 Identify CAN/CSA, ISO, and ANSI standards for technical drawings.

SLO 10.P.9.1.3 Follow building codes to create architectural models.

SLO 10.P.9.1.4 Identify the standards related to architectural and engineering working drawing view selection and placement.

SLO 10.P.9.1.5 Appreciate that drawings are legal and contractual.

GLO 9.2: Describe the **ethical expectations** of designers.

SLO 10.P.9.2.1 Practise ethical and responsible use of computer hardware and software.

SLO 10.P.9.2.2 Appreciate the ethical responsibilities of producing accurate design drafting documents.

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 10.P.10.1.1 Demonstrate and value safe work practices and procedures.
 - SLO 10.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 10.P.10.1.3 Demonstrate ergonomically correct procedures to avoid injury (e.g., stress, strain).
 - SLO 10.P.10.1.4 Identify personal responsibility for health and safety.
 - SLO 10.P.10.1.5 Identify and use the safety features of tools and equipment.
 - SLO 10.P.10.1.6 Follow emergency evacuation procedures.
 - SLO 10.P.10.1.7 Use appropriate aids to minimize risk of injury.
 - SLO 10.P.10.1.8 Use appropriate personal protective equipment.
 - SLO 10.P.10.1.9 Locate first aid stations and fire extinguishers.
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GLO 10.2: Describe **health and safety laws and regulations**.

- SLO 10.P.10.2.1 Describe the reporting process for injuries.
 - SLO 10.P.10.2.2 Identify WHMIS symbols and terminology, and follow WHMIS guidelines.
 - SLO 10.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 10.P.11.1.1 Explain the importance of employability skills.
 - SLO 10.P.11.1.2 Ask questions to clarify written or oral communication.
 - SLO 10.P.11.1.3 Identify sources of information and resources for design drafting.
 - SLO 10.P.11.1.4 Demonstrate an understanding of a problem-solving process for design drafting.
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GLO 11.2: Demonstrate **personal management** skills.

- SLO 10.P.11.2.1 Actively participate in a positive manner.
 - SLO 10.P.11.2.2 Complete tasks within stated time frames.
 - SLO 10.P.11.2.3 Demonstrate accountability for own actions.
 - SLO 10.P.11.2.4 Accept feedback, comments, and contributions from others.
 - SLO 10.P.11.2.5 Listen and respond in order to understand and learn.
 - SLO 10.P.11.2.6 Identify learning materials, resources, and opportunities.
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GLO 11.3: Demonstrate **teamwork** skills.

- SLO 10.P.11.3.1 Demonstrate an understanding of the roles of members of a group.
 - SLO 10.P.11.3.2 Actively participate in the work of a group.
 - SLO 10.P.11.3.3 Participate in the classroom/shop learning activities.
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Goal 12: Describe **career opportunities** in design drafting.

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

- SLO 10.P.12.1.1 Identify secondary (e.g., robotics, electronics, carpentry, art) and post-secondary (e.g., requirements, educational institutions, programs) paths related to design drafting.
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GLO 12.2: Describe **career opportunities** available in design drafting across industries.

- SLO 10.P.12.2.1 Explore architectural/engineering careers related to design drafting.
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GLO 12.3: Create, maintain, and present a **portfolio**.

- SLO 10.P.12.3.1 Collect architectural/engineering samples for a design drafting portfolio.
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