



9147

DRAFTING FOR MINING  
ENGINEERING (11)

30S/30E/30M



# 9147 DRAFTING FOR MINING ENGINEERING (11) 30S/30E/30M

## Course Description

Drafting for Mining Engineering is an entry-level drafting course that is intended for students wishing to explore drafting as it pertains to mining engineering technology. Curriculum content focuses on an introduction to design drafting, with an emphasis on its use in mines, mining structures, and mining equipment. 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.

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.

Because these two courses have similar outcomes, students can hold credits for either this course **or** 8435 Design Drafting Essentials 1 20S/20E/20M, which is part of the Design Drafting Technical-Vocational Subject Area (see [www.edu.gov.mb.ca/k12/cur/teched/sytep/design\\_drafting/index.html](http://www.edu.gov.mb.ca/k12/cur/teched/sytep/design_drafting/index.html)). Students **cannot** hold credit for both 8435 and 9147.

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

#### **GLO 1.1: Define design problems.**

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| SLO 1.1.1 | Identify a structured model to solve basic problems.   |
| SLO 1.1.2 | Identify drafting design problems in mining engineering technology.                                  |
| SLO 1.1.3 | Use a structured model to solve architectural/engineering problems in mining engineering technology. |
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**GLO 1.2: Research and analyze** verbal and numeric **information** for design solutions.

- SLO 1.2.1 Demonstrate an awareness of architectural design principles (e.g., work triangle, mining structures, circulation) in mining engineering technology.
  - SLO 1.2.2 Demonstrate an awareness of engineering design principles (e.g., physical properties, fits, mechanical principles) in mining engineering technology.
  - SLO 1.2.3 Identify factors (e.g., materials, cost, manufacturing processes) that influence design in mining engineering technology.
  - SLO 1.2.4 Discuss sustainability as it relates to design (e.g., materials used, social impact) in mining engineering technology.
  - SLO 1.2.5 Discuss universal design in mining engineering technology.
  - SLO 1.2.6 Demonstrate an awareness of aesthetic principles.
  - SLO 1.2.7 Identify common research methods used in design.
  - SLO 1.2.8 Follow architectural design principles (e.g., work triangle, circulation) for design solutions in mining engineering technology.
  - SLO 1.2.9 Follow engineering design principles (e.g., physical properties, fits, mechanical principles) in mining engineering technology.
  - SLO 1.2.10 Research information to solve design problems in mining engineering technology.
  - SLO 1.2.11 Include sustainable concepts in designs.
  - SLO 1.2.12 Include universal design in solutions.
  - SLO 1.2.13 Identify possible solutions for design problems in mining engineering technology.
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**GLO 1.3: Synthesize** information and ideas to create design solutions.

- SLO 1.3.1 Identify influences that can have an impact on the decision-making process for design solutions.
- SLO 1.3.2 Identify techniques used for 2-D and isometric sketching.
- SLO 1.3.3 Select design solutions based on provided criteria and related research.
- SLO 1.3.4 Create freehand sketches to solve architectural and engineering design problems.

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**Goal 2: Communicate** design solutions.**GLO 2.1:** Prepare **computer models** of design solutions.

- SLO 2.1.1 Identify the function of computer models (e.g., visualization, model to working drawing, assembly).
  - SLO 2.1.2 Define basic geometric construction principles (e.g., linear, angular, perpendicular, parallel, tangential).
  - SLO 2.1.3 Identify basic architectural components typically found in mines and mining structures.
  - SLO 2.1.4 Identify basic engineering features of parts (e.g., fillets, chamfers, holes).
  - SLO 2.1.5 Create basic architectural and engineering models of design solutions.
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**GLO 2.2: Prepare working and presentation drawings and documents.**

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

**Layout**

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

**Line Work**

- SLO 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 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**

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

### **Layout**

- SLO 2.2.10 Use the components (e.g., title blocks, border, sheet sizes, sheet layout, architectural scales) of an architectural drawing.
- SLO 2.2.11 Use the components (e.g., title block information, border with zones, view arrangements, engineering scale) of an engineering drawing.
- SLO 2.2.12 Create floor plans using architectural symbols (e.g., walls, doors, windows, built-ins, fixtures, stairs).
- SLO 2.2.13 Create orthographic projection drawings using basic engineering symbols.
- SLO 2.2.14 Apply basic geometric construction principles (e.g., linear, angular, perpendicular, parallel, tangential).

### **Line Work**

- SLO 2.2.15 Select and use basic line types for architectural and engineering applications.

### **Dimensioning and Annotating**

- SLO 2.2.16 Apply placement, styles, and rules of dimensioning following dimensioning standards.
- SLO 2.2.17 Apply the placement, style, size of text, and leaders for notes and abbreviations following standards.

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

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

- SLO 3.1.1 Describe the materials used in design solutions for typical mining engineering applications.
  - SLO 3.1.2 List materials used in design solutions for typical mining engineering applications.
  - SLO 3.1.3 Include materials notes in drawings.
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**GLO 3.2:** Demonstrate an awareness of construction and manufacturing processes.

SLO 3.2.1 Demonstrate an awareness of construction and manufacturing processes as they pertain to design drafting for mining engineering.

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**Goal 4: Present** design solutions.

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

SLO 4.1.1 Identify presentation methods (e.g., design briefs, sketches, drawings).  
SLO 4.1.2 Identify the rationale for presentations in the design process.  
SLO 4.1.3 Demonstrate presentation methods (e.g., oral, written, graphic, 3-D model).

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**GLO 4.2: Use presentation production methods.**

SLO 4.2.1 Identify the elements (e.g., rationale, functionality, research) of a design brief.  
SLO 4.2.2 Identify the function of 3-D models as presentation methods.  
SLO 4.2.3 Create design briefs to support design solutions.  
SLO 4.2.4 Create shaded 3-D computer models.  
SLO 4.2.5 Create physical models.

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**GLO 4.3: Present/defend design solutions.**

SLO 4.3.1 Identify elements (e.g., clarity, conciseness) of effective verbal communication.  
SLO 4.3.2 Demonstrate an awareness of competitions related to design drafting.  
SLO 4.3.3 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 5.1.1 Demonstrate the use of sketching tools and media.  
SLO 5.1.2 Demonstrate the use of physical modelling tools (e.g., scissors, knives, saws).

- SLO 5.1.3 Demonstrate the use of measuring devices (e.g., rulers; tape measures; engineering, architectural, and metric scales; calipers).
  - SLO 5.1.4 Demonstrate the use of sketching tools and media.
  - SLO 5.1.5 Demonstrate the use of basic physical modelling tools (e.g., scissors, knives, saws, tape measures, calipers).
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**GLO 5.2:** Describe and use **hardware and equipment**.

- SLO 5.2.1 Operate common computer hardware (e.g., three-button mouse, printers, monitors).
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**GLO 5.3:** Describe and use **software**.

- SLO 5.3.1 Demonstrate the use of industry-standard architectural and engineering CADD software.
  - SLO 5.3.2 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 6.1.1 Demonstrate the understanding and application of metric and imperial/standard systems of measurement.
  - SLO 6.1.2 Add, subtract, multiply, and divide fractions, decimals, feet, and inches.
  - SLO 6.1.3 Demonstrate the understanding and application of symbols related to imperial measurement (e.g., 2'-3").
  - SLO 6.1.4 Demonstrate the understanding and application of equivalent forms of fractions (e.g., " = ", lowest common denominator).
  - SLO 6.1.5 Identify standard drafting scales (e.g., relationship between ratios and fractions).
  - SLO 6.1.6 Relate the Cartesian coordinate system to CADD.
  - SLO 6.1.7 Use ratios for scale drawing.
  - SLO 6.1.8 Extract architectural and engineering data using measuring devices (e.g., rulers, tape measures, scales, calipers).
  - SLO 6.1.9 Calculate the length and area of buildings and individual rooms.
  - SLO 6.1.10 Calculate distance, area, and volume.
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**GLO 6.2: Read, interpret, and communicate** information.

SLO 6.2.1 Read, interpret, and communicate information as it pertains to design drafting for mining engineering.

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**Goal 7:** Demonstrate an awareness of **sustainability** as it pertains to design drafting.

**GLO 7.1:** Identify **environmental sustainability factors** that influence drafting design solutions in the mining industry.

SLO 7.1.1 Identify environmental sustainability factors that influence drafting design solutions in the mining industry.

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

SLO 7.2.1 Describe the impact of architectural/engineering design on **human health and well-being**.

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**GLO 7.3:** Demonstrate an awareness of the **economic impact** of sustainable practices in design drafting solutions for mining engineering technology.

SLO 7.3.1 Demonstrate an awareness of the economic impact of sustainable practices in design drafting solutions for mining engineering technology.

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**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 8.1.1 Demonstrate an appreciation of traditional design drafting tools, equipment, materials, and drawings.

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

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

**GLO 9.1:** Demonstrate an awareness of legal standards in design drafting.

SLO 9.1.1 Demonstrate an understanding of building codes and their purpose.

SLO 9.1.2 Demonstrate an awareness of the fact that drawings are legal and contractual.

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

SLO 9.2.1 Define ethics and their application.

SLO 9.2.2 Demonstrate an awareness of the ethical responsibilities of producing accurate design drafting documents.

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**Goal 10:** Demonstrate an awareness of **health and safety** requirements.

**GLO 10.1:** Demonstrate an awareness of **health and safety** requirements.

SLO 10.1.1 Demonstrate an awareness of **health and safety** requirements.

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**Goal 11:** Demonstrate **employability skills** required in design drafting.

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

SLO 11.1.1 Demonstrate regular and punctual attendance.

SLO 11.1.2 Demonstrate the ability to communicate respectfully and effectively with teachers, supervisors, co-workers, and students.

SLO 11.1.3 Demonstrate accountability by taking responsibility for their actions.

SLO 11.1.4 Demonstrate adaptability, initiative, and effort.

SLO 11.1.5 Demonstrate teamwork skills.

SLO 11.1.6 Demonstrate the ability to stay on task and effectively use time in class and work environments.

SLO 11.1.7 Demonstrate the responsible use of wireless communication devices.

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**Goal 12:** Describe **post-secondary** and **career opportunities** in design drafting.

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

SLO 12.1.1 Identify secondary and post-secondary educational opportunities in design drafting.

SLO 12.1.2 Identify careers related to design drafting.

SLO 12.1.3 Collect samples for a design drafting portfolio.

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