# DRAFTING/CAD
## Grade(s) 10-12

## Unit 1
## Introduction to Drafting & Design

### Essential Question
What is the role of drafting and design in engineering, architecture, and manufacturing?

### Unit Summary
Introduction to the importance, history, and applications of drafting and design, including career pathways.

### Guiding Questions
**Content**

- What are the basic drafting tools and their functions?
- How does drafting relate to different industries?
- What are the key principles of technical drawing?

**Process**

- How do we set up and interpret a technical drawing?
- How do professionals maintain accuracy in drafting?
- What are common drafting conventions?

**Reflective**

- Why is drafting important in today's industries?
- How can accuracy in drafting impact real-world projects?
- What skills do I need to improve?

## Priority Standards

- 1.1 - Identify and demonstrate the use of CAD commands and system peripherals.
- 1.2 - Demonstrate proficiency in setting limits and scale on the CAD system.
- 1.3 - Demonstrate proficiency in setting, turning on and turning off layers.
- 1.4 - Place text on a drawing and be able to change to different font styles, sizes, and angles.
- 1.5 - Be proficient in the use of printer/plotter operations.
- 1.6 - Demonstrate ability to place text on a drawing and change to different font styles, sizes, and angles.
- 1.7 - Demonstrate ability to dimension drawings on the CAD system.
- 1.8 - Construct drawings using straight line, circle, and hidden line statements, etc.
- 1.9 - Set grid and snap specifications.
- 1.10 - Define and use commands to modify a drawing.
- 1.11 - Use symbols (from a symbol library) in a drawing.

## Supporting Standards

- 1.1 - Create standard drawings and templates.
- 1.2 Demonstrate the ability to load, store files, and transport files via Internet.
- 1.3 - Construct isometric and 3D drawings.
- 1.4 - Use CAD drawings to produce a high or low-fidelity prototype or model.
- 1.1.1 - Demonstrate proficiency in setting limits and scale on the CAD system.
- 1.1.2 - Demonstrate the ability to dimension drawings on the CAD system.

# DRAFTING/CAD
## Grade(s) 10-12

## Unit 2
## Technical Drawing Fundamentals

### Essential Question
What are the fundamental principles of technical drawing?

### Unit Summary
Focuses on line types, sketching techniques, geometric construction, and lettering.

### Guiding Questions
**Content**

- What are the different line types and their meanings?
- How do geometric constructions support drafting?
- Why is proper lettering important?

**Process**

- How do we create different types of lines accurately?
- How can freehand sketching improve CAD drafting?
- How do we use drafting tools properly?

**Reflective**

- What challenges do I face in technical sketching?
- How does technical drawing prepare me for CAD?
- How does precision affect my work?

## Priority Standards

- 1.1 - Identify and demonstrate the use of CAD commands and system peripherals.
- 1.2 - Demonstrate proficiency in setting limits and scale on the CAD system.
- 1.3 - Demonstrate proficiency in setting, turning on and turning off layers.
- 1.4 - Place text on a drawing and be able to change to different font styles, sizes, and angles.
- 1.5 - Be proficient in the use of printer/plotter operations.
- 1.6 - Demonstrate ability to place text on a drawing and change to different font styles, sizes, and angles.
- 1.7 - Demonstrate ability to dimension drawings on the CAD system.
- 1.8 - Construct drawings using straight line, circle, and hidden line statements, etc.
- 1.9 - Set grid and snap specifications.
- 1.10 - Define and use commands to modify a drawing.
- 1.11 - Use symbols (from a symbol library) in a drawing.

## Supporting Standards

- 1.1 - Create standard drawings and templates.
- 1.2 Demonstrate the ability to load, store files, and transport files via Internet.
- 1.3 - Construct isometric and 3D drawings.
- 1.4 - Use CAD drawings to produce a high or low-fidelity prototype or model.
- 1.1.1 - Demonstrate proficiency in setting limits and scale on the CAD system.
- 1.1.2 - Demonstrate the ability to dimension drawings on the CAD system.

# DRAFTING/CAD
## Grade(s) 10-12

## Unit 3
## Orthographic Projection & Multiview Drawings

### Essential Question
How do orthographic projections represent 3D objects accurately?

### Unit Summary
Covers multiview drawings, projection methods, and visualization skills.

### Guiding Questions
**Content**

- What are the standard views in an orthographic projection?
- How do hidden and centerlines improve clarity?
- What are the rules of projection?

**Process**

- How do we create a three-view drawing?
- How do we ensure accuracy in dimensioning?
- What techniques improve visualization of 3D objects?

**Reflective**

- Why is orthographic projection necessary?
- How does my understanding of 3D space influence my drawings?
- What areas need improvement?

## Priority Standards

- 1.1 - Identify and demonstrate the use of CAD commands and system peripherals.
- 1.2 - Demonstrate proficiency in setting limits and scale on the CAD system.
- 1.3 - Demonstrate proficiency in setting, turning on and turning off layers.
- 1.4 - Place text on a drawing and be able to change to different font styles, sizes, and angles.
- 1.5 - Be proficient in the use of printer/plotter operations.
- 1.6 - Demonstrate ability to place text on a drawing and change to different font styles, sizes, and angles.
- 1.7 - Demonstrate ability to dimension drawings on the CAD system.
- 1.8 - Construct drawings using straight line, circle, and hidden line statements, etc.
- 1.9 - Set grid and snap specifications.
- 1.10 - Define and use commands to modify a drawing.
- 1.11 - Use symbols (from a symbol library) in a drawing.

## Supporting Standards

- 1.1 - Create standard drawings and templates.
- 1.2 Demonstrate the ability to load, store files, and transport files via Internet.
- 1.3 - Construct isometric and 3D drawings.
- 1.4 - Use CAD drawings to produce a high or low-fidelity prototype or model.
- 1.1.1 - Demonstrate proficiency in setting limits and scale on the CAD system.
- 1.1.2 - Demonstrate the ability to dimension drawings on the CAD system.

# DRAFTING/CAD
## Grade(s) 10-12

## Unit 4
## Introduction to CAD (2D Drafting)

### Essential Question
How does computer-aided design improve efficiency in drafting?

### Unit Summary
Introduction to CAD software, including commands, tools, and interface navigation.

### Guiding Questions
**Content**

- What are the key features of CAD software?
- How do layers organize a drawing?
- What commands are essential for basic drafting?

**Process**

- How do we create and modify drawings in CAD?
- How do we apply proper scaling and limits?
- What are the best practices for file management?

**Reflective**

- How does CAD differ from manual drafting?
- What advantages does CAD provide?
- How can I improve my efficiency in CAD?

## Priority Standards

- 1.1 - Identify and demonstrate the use of CAD commands and system peripherals.
- 1.2 - Demonstrate proficiency in setting limits and scale on the CAD system.
- 1.3 - Demonstrate proficiency in setting, turning on and turning off layers.
- 1.4 - Place text on a drawing and be able to change to different font styles, sizes, and angles.
- 1.5 - Be proficient in the use of printer/plotter operations.
- 1.6 - Demonstrate ability to place text on a drawing and change to different font styles, sizes, and angles.
- 1.7 - Demonstrate ability to dimension drawings on the CAD system.
- 1.8 - Construct drawings using straight line, circle, and hidden line statements, etc.
- 1.9 - Set grid and snap specifications.
- 1.10 - Define and use commands to modify a drawing.
- 1.11 - Use symbols (from a symbol library) in a drawing.

## Supporting Standards

- 1.1 - Create standard drawings and templates.
- 1.2 Demonstrate the ability to load, store files, and transport files via Internet.
- 1.3 - Construct isometric and 3D drawings.
- 1.4 - Use CAD drawings to produce a high or low-fidelity prototype or model.
- 1.1.1 - Demonstrate proficiency in setting limits and scale on the CAD system.
- 1.1.2 - Demonstrate the ability to dimension drawings on the CAD system.

# DRAFTING/CAD
## Grade(s) 10-12

## Unit 5
## Advanced 2D Drafting & Annotation

### Essential Question
How do precision and annotation enhance technical drawings?

### Unit Summary
Focuses on advanced 2D CAD techniques, dimensioning, text styles, and plot settings.

### Guiding Questions
**Content**

- How do we apply dimensioning standards in CAD?
- What are common annotation practices?
- How does scaling affect output?

**Process**

- How do we use dimensioning tools effectively?
- How do we ensure proper line weights and text alignment?
- What are the steps to setting up a title block?

**Reflective**

- How does annotation improve communication?
- What challenges do I face in dimensioning?
- How can I make my drawings more professional?

## Priority Standards

- 1.1 - Identify and demonstrate the use of CAD commands and system peripherals.
- 1.2 - Demonstrate proficiency in setting limits and scale on the CAD system.
- 1.3 - Demonstrate proficiency in setting, turning on and turning off layers.
- 1.4 - Place text on a drawing and be able to change to different font styles, sizes, and angles.
- 1.5 - Be proficient in the use of printer/plotter operations.
- 1.6 - Demonstrate ability to place text on a drawing and change to different font styles, sizes, and angles.
- 1.7 - Demonstrate ability to dimension drawings on the CAD system.
- 1.8 - Construct drawings using straight line, circle, and hidden line statements, etc.
- 1.9 - Set grid and snap specifications.
- 1.10 - Define and use commands to modify a drawing.
- 1.11 - Use symbols (from a symbol library) in a drawing.

## Supporting Standards

- 1.1 - Create standard drawings and templates.
- 1.2 Demonstrate the ability to load, store files, and transport files via Internet.
- 1.3 - Construct isometric and 3D drawings.
- 1.4 - Use CAD drawings to produce a high or low-fidelity prototype or model.
- 1.1.1 - Demonstrate proficiency in setting limits and scale on the CAD system.
- 1.1.2 - Demonstrate the ability to dimension drawings on the CAD system.

# DRAFTING/CAD
## Grade(s) 10-12

## Unit 6
## Project: 2D Drafting Application

### Essential Question
How do we apply 2D drafting skills to real-world projects?

### Unit Summary
Students complete a detailed 2D drawing based on given specifications.

### Guiding Questions
**Content**

- What are the requirements for a complete technical drawing?
- How do industry standards apply to real-world designs?
- What are common mistakes in 2D drafting?

**Process**

- How do we plan and execute a complex drawing?
- How do we verify accuracy in measurements?
- What tools ensure consistency in drafting?

**Reflective**

- How did my drafting skills improve?
- What challenges did I overcome?
- How does this project prepare me for future work?

## Priority Standards

- 1.1 - Identify and demonstrate the use of CAD commands and system peripherals.
- 1.2 - Demonstrate proficiency in setting limits and scale on the CAD system.
- 1.3 - Demonstrate proficiency in setting, turning on and turning off layers.
- 1.4 - Place text on a drawing and be able to change to different font styles, sizes, and angles.
- 1.5 - Be proficient in the use of printer/plotter operations.
- 1.6 - Demonstrate ability to place text on a drawing and change to different font styles, sizes, and angles.
- 1.7 - Demonstrate ability to dimension drawings on the CAD system.
- 1.8 - Construct drawings using straight line, circle, and hidden line statements, etc.
- 1.9 - Set grid and snap specifications.
- 1.10 - Define and use commands to modify a drawing.
- 1.11 - Use symbols (from a symbol library) in a drawing.

## Supporting Standards

- 1.1 - Create standard drawings and templates.
- 1.2 Demonstrate the ability to load, store files, and transport files via Internet.
- 1.3 - Construct isometric and 3D drawings.
- 1.4 - Use CAD drawings to produce a high or low-fidelity prototype or model.
- 1.1.1 - Demonstrate proficiency in setting limits and scale on the CAD system.
- 1.1.2 - Demonstrate the ability to dimension drawings on the CAD system.

# DRAFTING/CAD
## Grade(s) 10-12

## Unit 7
## Introduction to 3D Modeling

### Essential Question
How does 3D modeling enhance design communication?

### Unit Summary
Covers basic 3D CAD commands, extrusions, and parametric modeling.

### Guiding Questions
**Content**

- What are the fundamental principles of 3D modeling?
- How does parametric design improve workflow?
- What are common file formats for 3D models?

**Process**

- How do we create a 3D part from a 2D sketch?
- How do we apply constraints in modeling?
- What are best practices for organizing model files?

**Reflective**

- How does 3D modeling differ from 2D drafting?
- What challenges do I face in 3D design?
- How can I improve my efficiency?

## Priority Standards

- 1.1 - Identify and demonstrate the use of CAD commands and system peripherals.
- 1.2 - Demonstrate proficiency in setting limits and scale on the CAD system.
- 1.3 - Demonstrate proficiency in setting, turning on and turning off layers.
- 1.4 - Place text on a drawing and be able to change to different font styles, sizes, and angles.
- 1.5 - Be proficient in the use of printer/plotter operations.
- 1.6 - Demonstrate ability to place text on a drawing and change to different font styles, sizes, and angles.
- 1.7 - Demonstrate ability to dimension drawings on the CAD system.
- 1.8 - Construct drawings using straight line, circle, and hidden line statements, etc.
- 1.9 - Set grid and snap specifications.
- 1.10 - Define and use commands to modify a drawing.
- 1.11 - Use symbols (from a symbol library) in a drawing.

## Supporting Standards

- 1.1 - Create standard drawings and templates.
- 1.2 Demonstrate the ability to load, store files, and transport files via Internet.
- 1.3 - Construct isometric and 3D drawings.
- 1.4 - Use CAD drawings to produce a high or low-fidelity prototype or model.
- 1.1.1 - Demonstrate proficiency in setting limits and scale on the CAD system.
- 1.1.2 - Demonstrate the ability to dimension drawings on the CAD system.

# DRAFTING/CAD
## Grade(s) 10-12

## Unit 8
## Advanced 3D Modeling Techniques

### Essential Question
How do advanced modeling tools improve product design?

### Unit Summary
Covers assemblies, sweeps, lofts, and parametric features.

### Guiding Questions
**Content**

- What are the advantages of parametric assemblies?
- How do sweeps and lofts enhance design capabilities?
- What are best practices for constraints?

**Process**

- How do we create and manage assemblies?
- How do advanced features improve model efficiency?
- What strategies optimize large models?

**Reflective**

- How has my understanding of CAD improved?
- What advanced tools am I most comfortable with?
- What areas still need development?

## Priority Standards

- 1.1 - Identify and demonstrate the use of CAD commands and system peripherals.
- 1.2 - Demonstrate proficiency in setting limits and scale on the CAD system.
- 1.3 - Demonstrate proficiency in setting, turning on and turning off layers.
- 1.4 - Place text on a drawing and be able to change to different font styles, sizes, and angles.
- 1.5 - Be proficient in the use of printer/plotter operations.
- 1.6 - Demonstrate ability to place text on a drawing and change to different font styles, sizes, and angles.
- 1.7 - Demonstrate ability to dimension drawings on the CAD system.
- 1.8 - Construct drawings using straight line, circle, and hidden line statements, etc.
- 1.9 - Set grid and snap specifications.
- 1.10 - Define and use commands to modify a drawing.
- 1.11 - Use symbols (from a symbol library) in a drawing.

## Supporting Standards

- 1.1 - Create standard drawings and templates.
- 1.2 Demonstrate the ability to load, store files, and transport files via Internet.
- 1.3 - Construct isometric and 3D drawings.
- 1.4 - Use CAD drawings to produce a high or low-fidelity prototype or model.
- 1.1.1 - Demonstrate proficiency in setting limits and scale on the CAD system.
- 1.1.2 - Demonstrate the ability to dimension drawings on the CAD system.

# DRAFTING/CAD
## Grade(s) 10-12

## Unit 9
## Dimensioning & Tolerancing

### Essential Question
Why is precision critical in manufacturing and engineering?

### Unit Summary
Covers GD&T principles, tolerancing, and industry standards.

### Guiding Questions
**Content**

- What are the types of tolerances?
- How does GD&T improve design accuracy?
- Why do manufacturing processes require specific tolerances?

**Process**

- How do we apply tolerances in CAD?
- How do GD&T symbols communicate design intent?
- What tools help analyze fit and function?

**Reflective**

- How does tolerance affect part production?
- What challenges do I face in applying GD&T?
- How can I improve my precision?

## Priority Standards

- 1.1 - Identify and demonstrate the use of CAD commands and system peripherals.
- 1.2 - Demonstrate proficiency in setting limits and scale on the CAD system.
- 1.3 - Demonstrate proficiency in setting, turning on and turning off layers.
- 1.4 - Place text on a drawing and be able to change to different font styles, sizes, and angles.
- 1.5 - Be proficient in the use of printer/plotter operations.
- 1.6 - Demonstrate ability to place text on a drawing and change to different font styles, sizes, and angles.
- 1.7 - Demonstrate ability to dimension drawings on the CAD system.
- 1.8 - Construct drawings using straight line, circle, and hidden line statements, etc.
- 1.9 - Set grid and snap specifications.
- 1.10 - Define and use commands to modify a drawing.
- 1.11 - Use symbols (from a symbol library) in a drawing.

## Supporting Standards

- 1.1 - Create standard drawings and templates.
- 1.2 Demonstrate the ability to load, store files, and transport files via Internet.
- 1.3 - Construct isometric and 3D drawings.
- 1.4 - Use CAD drawings to produce a high or low-fidelity prototype or model.
- 1.1.1 - Demonstrate proficiency in setting limits and scale on the CAD system.
- 1.1.2 - Demonstrate the ability to dimension drawings on the CAD system.

# DRAFTING/CAD
## Grade(s) 10-12

## Unit 10
## Rendering & Visualization

### Essential Question
How does rendering improve design presentation?

### Unit Summary
Covers material applications, lighting, and photorealistic rendering.

### Guiding Questions
**Content**
- What are the key elements of a high-quality render?
- How does lighting affect visualization?
- What software tools enhance rendering?

**Process**
- How do we apply materials in CAD?
- How do we adjust camera settings for better presentation?
- What are best practices for exporting renders?

**Reflective**
- How does visualization enhance client communication?
- What improvements can I make in my rendering workflow?
- What rendering techniques interest me most?

## Priority Standards

- 1.1 - Identify and demonstrate the use of CAD commands and system peripherals.
- 1.2 - Demonstrate proficiency in setting limits and scale on the CAD system.
- 1.3 - Demonstrate proficiency in setting, turning on and turning off layers.
- 1.4 - Place text on a drawing and be able to change to different font styles, sizes, and angles.
- 1.5 - Be proficient in the use of printer/plotter operations.
- 1.6 - Demonstrate ability to place text on a drawing and change to different font styles, sizes, and angles.
- 1.7 - Demonstrate ability to dimension drawings on the CAD system.
- 1.8 - Construct drawings using straight line, circle, and hidden line statements, etc.
- 1.9 - Set grid and snap specifications.
- 1.10 - Define and use commands to modify a drawing.
- 1.11 - Use symbols (from a symbol library) in a drawing.

## Supporting Standards

- 1.1 - Create standard drawings and templates.
- 1.2 Demonstrate the ability to load, store files, and transport files via Internet.
- 1.3 - Construct isometric and 3D drawings.
- 1.4 - Use CAD drawings to produce a high or low-fidelity prototype or model.
- 1.1.1 - Demonstrate proficiency in setting limits and scale on the CAD system.
- 1.1.2 - Demonstrate the ability to dimension drawings on the CAD system.

# DRAFTING/CAD
## Grade(s) 10-12

## Unit 11
## Introduction to CAM & Digital Fabrication

### Essential Question
How do CAD models integrate with CNC and digital fabrication?

### Unit Summary
Covers CNC programming, laser cutting, and 3D printing basics.

### Guiding Questions
**Content**

- How do CAD models translate into machine instructions?
- What are common digital fabrication tools?
- How does G-code control CNC machines?

**Process**

- How do we prepare a model for 3D printing?
- How do we generate toolpaths for CNC cutting?
- What factors affect fabrication success?

**Reflective**

- How does CAM impact the design process?
- What challenges arise in digital fabrication?
- What areas do I need to explore further?

## Priority Standards

- 1.1 - Identify and demonstrate the use of CAD commands and system peripherals.
- 1.2 - Demonstrate proficiency in setting limits and scale on the CAD system.
- 1.3 - Demonstrate proficiency in setting, turning on and turning off layers.
- 1.4 - Place text on a drawing and be able to change to different font styles, sizes, and angles.
- 1.5 - Be proficient in the use of printer/plotter operations.
- 1.6 - Demonstrate ability to place text on a drawing and change to different font styles, sizes, and angles.
- 1.7 - Demonstrate ability to dimension drawings on the CAD system.
- 1.8 - Construct drawings using straight line, circle, and hidden line statements, etc.
- 1.9 - Set grid and snap specifications.
- 1.10 - Define and use commands to modify a drawing.
- 1.11 - Use symbols (from a symbol library) in a drawing.

## Supporting Standard

- 1.1 - Create standard drawings and templates.
- 1.2 Demonstrate the ability to load, store files, and transport files via Internet.
- 1.3 - Construct isometric and 3D drawings.
- 1.4 - Use CAD drawings to produce a high or low-fidelity prototype or model.
- 1.1.1 - Demonstrate proficiency in setting limits and scale on the CAD system.
- 1.1.2 - Demonstrate the ability to dimension drawings on the CAD system.

# DRAFTING/CAD
## Grade(s) 10-12

## Unit 12
## Capstone Project: Design & Prototyping

### Essential Question
How do we apply CAD skills to solve real-world problems?

### Unit Summary
Students complete an industry-related design challenge from concept to prototype.

### Guiding Questions
**Content**

- What are the steps of product development?
- How do industry standards apply?
- What role does prototyping play in design?

**Process**

- How do we iterate and refine designs?
- How do we validate a prototype's effectiveness?
- What strategies ensure project success?

**Reflective**

- How has my CAD proficiency evolved?
- What was the most valuable lesson?
- How can I apply these skills in future careers?

## Priority Standards

- 1.1 - Identify and demonstrate the use of CAD commands and system peripherals.
- 1.2 - Demonstrate proficiency in setting limits and scale on the CAD system.
- 1.3 - Demonstrate proficiency in setting, turning on and turning off layers.
- 1.4 - Place text on a drawing and be able to change to different font styles, sizes, and angles.
- 1.5 - Be proficient in the use of printer/plotter operations.
- 1.6 - Demonstrate ability to place text on a drawing and change to different font styles, sizes, and angles.
- 1.7 - Demonstrate ability to dimension drawings on the CAD system.
- 1.8 - Construct drawings using straight line, circle, and hidden line statements, etc.
- 1.9 - Set grid and snap specifications.
- 1.10 - Define and use commands to modify a drawing.
- 1.11 - Use symbols (from a symbol library) in a drawing.

## Supporting Standards

- 1.1 - Create standard drawings and templates.
- 1.2 Demonstrate the ability to load, store files, and transport files via Internet.
- 1.3 - Construct isometric and 3D drawings.
- 1.4 - Use CAD drawings to produce a high or low-fidelity prototype or model.
- 1.1.1 - Demonstrate proficiency in setting limits and scale on the CAD system.
- 1.1.2 - Demonstrate the ability to dimension drawings on the CAD system.