Little Chute

Mechanical Drafting 1

Technology and Engineering

Grades 10 - 12, .5 Credits

Course Overview

Mechanical Drafting 1 is an in-depth study of measurement, visualization, sketching, orthographic projection, isometrics, oblique drawing, geometric construction, terminology and CAD as it pertains to industry. The main focus of Mechanical Drafting 1 is to transfer and apply ideas and concepts from math courses to real world applications.

Scope and Sequence

Timeframe	Unit	Instructional Topics
4 Week(s)	Orthographic Projection	1. Geometric Application in Orthographic Projection 2. Terminology 3. Drawings, Charts and Scales 4. Rapid Prototype
4 Week(s)	Isometric Drawing	1. Geometric Application in Isometric Drawings 2. Isometric Terminology 3. Drawing, Charts and Scales 4. Rapid Prototype
1 Week(s)	Obliques	1. Geometric Application in Oblique Drawings 2. Oblique Terminology 3. Drawing and Charts
1 Week(s)	Literacy Integration	1. Assembly Instructions
Ongoing	Computer Technology	1. CAD Application

Prerequisites

None

Materials and Resources

- Pencil
- Folder

Course Details

UNIT: Orthographic Projection -- 4 Week(s)

Description
Students will be expected to actively participate in classroom lessons and activities that progress from very simple drawings to more complex applications of orthographic projection drawings.

Students will complete 50% of drawings on computers and 50% of drawings on tables.

Academic Vocabulary
Counterbore, Countersink, Bevel, Chamfer, Fillet, Rounds, Hidden Lines, Object Lines, Center Lines, Leader, Construction Line.

Materials and Resources

- Instructor Packets.

TOPIC: Geometric Application in Orthographic Projection [Ongoing]

Description
The student will gain practical application of geometry concepts.

Learning Targets

Students will apply geometry vocabulary in hands-on activities.

Vocabulary to include but not a complete list: compass, angles, acute, right, obtuse, perpendicular, parallel, pentagon, hexagon, octagon, circle, bisect, tangent, inscribe, circumscribe, square, rectangle, centerpoint, mid-point

Students will be able to graphically communicate ideas and concepts through physical manipulation using hand tools and computers.

Students will complete a Geometric Construction packet.

This packet will include but not be limited to line construction, geometric shape identification, arch construction, and tangents.

TOPIC: Terminology [Ongoing]

Description
Industry terms, and applications will be used and addressed as needed.

Learning Targets

Students will define and use appropriate shop and CAD related terminology during orthographic projection activites.

Unit Content Vocabulary:
Counterbore, Countersink, Ream, Drill, Punch, Tap, Centerline, Center-mark, Bevel, Chamfer, Fillet, Rounds, Snap, Midpoint, Intersection, Tangent, Perpendicular, Parallel, Offset, Radius, Diameter, Trim, Erase, Extend, Move, Line, Mirror, Circle, Tangent-Tangent-Radius, 3 Point Circle, 2 Point Circle, Surfaces, Hidden Lines, Object Lines, Center Lines, Leader, Guide Line, Construction Line.

TOPIC: Drawings, Charts and Scales [Ongoing]

Learning Targets

Students will draw numerous orthographic problems with different degrees of difficulty.

These drawings will begin with basic shapes and progress to higher level drawings to include tolerancing, centerlines, reams etc.

Students will read charts, and scales to interpret data.

TOPIC: Rapid Prototype -- 5 Day(s)

Description
Students, on an individual basis, will program the Rapid Prototype with the help of the instructor.

Learning Targets

Students will use the Rapid Prototype to create and manipulate a 3D visual of items they have drawn.

This process makes a visual connection between theory and practical application to industry.

UNIT: Isometric Drawing -- 4 Week(s)

Description
Students will be expected to actively participate in classroom lessons and activities that progress from very simple drawings to more complex applications of Isometric drawings.

Students will complete 50% of drawings on computers and 50% of drawings on tables.

Academic Vocabulary
Unit Content Vocabulary:
Bevel, Chamfer, Fillet, Rounds, Tangent, Perpendicular, Parallel, Offset, Radius, Diameter, Surfaces,

Materials and Resources

- Instructor Packets.

TOPIC: Geometric Application in Isometric Drawings [Ongoing]

Description
The student will gain practical application of geometry concepts.

Learning Targets

Students will apply geometry vocabulary in hands-on activities.

Vocabulary to include but not a complete list: compass, angles, acute, right, obtuse, perpendicular, parallel, pentagon, hexagon, octagon, circle, bisect, tangent, inscribe, circumscribe, square, rectangle, centerpoint, mid-point

Students will be able to graphically communicate ideas and concepts through physical manipulation using hand tools and computers.

Students will complete an Isometric packet.

This packet will include but not be limited to line construction, geometric shape identification, arch construction, line construction, arch construction, geometric shape. and tangents.

TOPIC: Isometric Terminology [Ongoing]

Description
Industry terms, and applications will be used and addressed as needed.

Learning Targets

Students will define and use appropriate shop and CAD related terminology during Isometric drawing activites.

Counterbore, Countersink, Ream, Drill, Punch, Tap, Centerline, Center-mark, Bevel, Chamfer, Fillet, Rounds, Snap, Midpoint, Intersection, Tangent, Perpendicular, Parallel, Offset, Radius, Diameter, Trim, Erase, Extend, Move, Line, Mirror, Circle, Tangent-Tangent-Radius, 3 Point Circle, 2 Point Circle, Surfaces, Hidden Lines, Object Lines, Center Lines, Leader, Guide Line, Construction Line, Line Construction, Arch Construction, Geometric Shape.

TOPIC: Drawing, Charts and Scales [Ongoing]

Learning Targets

Students will draw numerous Isometric problems with different degrees of difficulty.

These drawings will begin with basic shapes and progress to higher level drawings to include tolerancing, centerlines, reams etc.

Students will read charts, and scales to interpret data.

TOPIC: Rapid Prototype -- 5 Day(s)

Description
Students, on an individual basis, will program the Rapid Prototype with the help of the instructor.

Learning Targets

Students will use the Rapid Prototype to create and manipulate a 3D visual of items they have drawn.

This process makes a visual connection between theory and practical application to industry.

UNIT: Obliques -- 1 Week(s)

Description
Students will be expected to actively participate in classroom lessons and activities that progress from very simple drawings to more complex applications of oblique drawings.

Students will complete 50% of drawings on computers and 50% of drawings on tables.

Academic Vocabulary
Unit Content Vocabulary:
Snap, Midpoint, Intersection, Tangent, Perpendicular, Parallel, Offset, Radius, Diameter, Trim, Erase, Extend, Move, Mirror, Tangent-Tangent-Radius,

Materials and Resources

- Instructor Packets.

TOPIC: Geometric Application in Oblique Drawings [Ongoing]

Description
The student will gain practical application of geometry concepts.

Learning Targets

Students will apply geometry vocabulary in hands-on activities.

Vocabulary to include but not a complete list: compass, angles, acute, right, obtuse, perpendicular, parallel, pentagon, hexagon, octagon, circle, bisect, tangent, inscribe, circumscribe, square, rectangle, centerpoint, mid-point

Students will apply prior knowledge and skills to oblique drawings.

Students will be able to graphically communicate ideas and concepts through physical manipulation using hand tools and computers.

TOPIC: Oblique Terminology [Ongoing]

Description
Industry terms, and applications will be used and addressed as needed.

Learning Targets

Students will define and use appropriate shop and CAD related terminology during Isometric drawing activites.

Unit Content Vocabulary:
Counterbore, Countersink, Ream, Drill, Punch, Tap, Centerline, Center-mark, Bevel, Chamfer, Fillet, Rounds, Snap, Midpoint, Intersection, Tangent, Perpendicular, Parallel, Offset, Radius, Diameter, Trim, Erase, Extend, Move, Line, Mirror, Circle, Tangent-Tangent-Radius, 3 Point Circle, 2 Point Circle, Surfaces, Hidden Lines, Object Lines, Center Lines, Leader, Guide Line, Construction Line, Line Construction, Arch Construction, Geometric Shape.

TOPIC: Drawing and Charts [Ongoing]

Learning Targets

Students will create and read charts and scales to interpret data.

Students will draw numerous oblique problems with different degrees of difficulty, by hand or on the computer.

These drawings will review concepts from orthographic and isometic units.

UNIT: Literacy Integration -- 1 Week(s)

Description
In Mechanical Drafting students apply Six Trait skills by writing a set of instructions.

Materials and Resources
Duplo Legos
Paper
Pencil
Eraser

TOPIC: Assembly Instructions -- 1 Week(s)

Description
Six Trait focus:
Organization
Ideas
Conventions

Learning Targets

Students will draw a Duplo creation and a peer will reassemble the figure based upon the drawing.

Students will write a set of directions so a peer can recreate the Duplo creation.

UNIT: Computer Technology -- Ongoing

Description
Students will apply hand draftsman drawing skills on the computer using a CAD program.

TOPIC: CAD Application [Ongoing]

Description
Students will apply knowledge in a different technology process.

Learning Targets

Students will be exposed to the Rapid Prototype machine.

Students will use a CAD program to draw simple to complex 3D orthographic, oblique and isometric drawings.