Monroe Career & Technical Institute

Course: Drafting and Design Technology

Unit Name: Develop your ideas by sketching
Number: 001 **Hours:** 2.00
Dates: Spring 2023

Description/Objectives:

Learn traditional sketches guidelines
Construct rough sketches
Prepare preliminary illustrations for a project

Tasks:

Learn and prepare various types of sketches
Use various grades of pencils to construct contrasting line conventions
Use different types of sketching medium
Practice sketching exercises
Transfer measurements from scaled drawing
Sketch to proportion

Instructional Activities:

Knowledge:
View sample sketches on video
Learn and prepare various types of sketches
Practice sketching exercises
Transfer measurements from scaled drawing
Demonstrate scaling and proportion

Skill:
Use various grades of pencils to construct contrasting line conventions
Use different types of sketching medium
Sketch to proportion

Remediation:
Review technique
Review major concepts
Review with teacher assistance
Additional assignment required

Enrichment:
Large size sketch
Colorization of sketch
Competition practice
Special projects

Special Adaptations:

- Extended Time (assignments and/or testing)
- Chunking of Assignments/Material
- Study Guide
- Use of Calculator
- Directions and/or Tests Read Aloud
- Preferential Seating
- Adapted Tests and/or Assignments
- Taking Tests in Alternate Setting (or if requested)

- Verbal/Gestural Redirection (prompts to remain on task)
- Use of Computer (Access to)
- Positive Reinforcement
- Wait Time
- Access to School Counselor

Safety:

Student must:
Follow manufacturer’s directions when using any product, tool, equipment, etc.
Use tools and equipment in a professional work like manner according to OSHA standards
Know and follow the established safety rules at all times
Know and follow fire and emergency procedures

Assessment:

- Graded Writing assignments
- Traditional Quizzes - multiple choice, matching, true/false, short answer completion
- Traditional Tests - multiple choice, matching, true/false, short answer completion
- Exit Slips
- Teacher observing and recording the quality of work being done on an assigned job
- WORK ETHIC
- SPECIAL NEEDS ASSESSMENT ADAPTATIONS:
- Study guides provided prior to tests
- Extended time to complete the assessment
- Word bank with no more than 10 options
- Word bank with no more than 5 options
- Multiple Choice will include 3 choices instead of 4

Resources/Equipment:

Overhead projector Pencil Sketch pad EraserHyperlinks:

Monroe Career & Technical Institute

Course: Drafting and Design Technology

Unit Name: 100 ORIENTATION
Number: 100 **Hours:** 16.00
Dates: Spring 2025

Description/Objectives:

Student will know and be able to safely use the equipment and materials required in the program in a professional manor.

Tasks:

PA101 - Follow safety measures in the drafting room.

PA102 - Demonstrate professionalism.

Standards / Assessment Anchors
Focus Anchor/Standard #1:

- Pennsylvania Core Standards for Reading for Technical Subjects Standard 3.5

Supporting Anchor/Standards:

KEY IDEAS/DETAILS GRADES 9-10-11-12
Standard CC.3.5.9-10.A / Standard CC.3.5.11-12A Cite specific textual evidence, etc.
Standard CC.3.5.9-10 B / Standard CC.3.5.11-12 B Determine the central ideas or conclusions of a text; etc.
Standard CC.3.5.9-10.C / Standard CC.3.5.11-12.C Follow precisely a complex multistep procedure, etc.
CRAFT & STRUCTURE GRADES 9-10-11-12
Standard CC.3.5.9-10. D / Standard CC.3.5.11-12.D Determine the meaning of symbols, key terms, and other domain specific words.
Standard CC.3.5.9-10.E / Standard CC.3.5.11-12.E Analyze the structure of the relationships among concepts in a text, etc.
Standard CC.3.5.9-10.F / Standard CC.3.5.11-12.F Analyze the author’s purpose in providing an explanation, describing a procedure...and Analyze the structure of the relationships among concepts in a text.
INTEGRATE KNOWLEDGE & IDEAS GRADES 9-10
Standard CC.3.5.9-10.G Translate quantitative or technical information expressed in a text into visual form (e.g. a table or chart).
Standard CC.3.5.9-10. H Assess the reasoning in a text to support the author’s claim for solving a technical problem.
Standard CC.3.5.9-10. I Compare and contrast findings presented in a text to those from other sources, etc.
INTEGRATE KNOWLEDGE & IDEAS GRADES 11-12
Standard CC.3.5.11-12. G Integrate and evaluate multiple sources of information presented in diverse formats...to solve a problem.
Standard CC.3.5.11-12. H Evaluate the hypotheses, data, analysis, and conclusions in a technical text, verifying the data when possible.
Standard CC.3.5.11-12. I Synthesize information from a range of sources into a coherent understanding.
RANGE OF READING GRADES 9-10-11-12
Standard CC.3.5.9-10.J / Standard CC.3.5.11-12.J By the end of grades 9-10, AND 11- 12, read and comprehend technical texts independently and proficiently.

Focus Anchor/Standard #2:

- Career Education and Work Standards
  13.3. Career Retention and Advancement

Supporting Anchor/Standards:

13.3.11 A. Evaluate personal attitudes and work habits that support career retention and advancement.

13.3.11 B. Evaluate team member roles to describe and illustrate active listening techniques: Clarifying Encouraging Reflecting Restating Summarizing

13.3.11 C. Evaluate conflict resolution skills as they relate to the workplace: Constructive criticism Group dynamics Managing/leadership Mediation Negotiation Problem solving

Instructional Activities:

Knowledge:
Identify the professions which employ various types of drafters
Identify the different types of engineering
Discuss the requirements for becoming a drafter
Define and review career objectives and career paths
Identify the workplace rights and responsibilities of both the employee and the employer
Describe the steps involved in the development of a drafting solution
Review the latest technologies used in drafting
Become familiar with technical publications

Skill:
Demonstrate awareness of a professional office atmosphere:
proper body mechanics
proper manners
working without disturbing others
adherence to due dates
record on time-card the amount of time spent on projects
keeping a chronological binder of assignments
drafting equipment and materials knowledge and safe use
maintain personal work space

Remediation:
Review career objectives
Review major concepts
Review with teacher assistance

Enrichment:
Computer research on related career choice
Competition practice
Special projects

Special Adaptations:

- Extended Time (assignments and/or testing)
- Chunking of Assignments/Material
- Study Guide
- Use of Calculator
- Directions and/or Tests Read Aloud
- Preferential Seating
- Adapted Tests and/or Assignments
- Taking Tests in Alternate Setting (or if requested)
- Verbal/Gestural Redirection (prompts to remain on task)
- Use of Computer (Access to)
- Positive Reinforcement
- Wait Time
- Access to School Counselor

Safety:

Student must:
Follow manufacturer’s directions when using any product, tool, equipment, etc.
Use tools and equipment in a professional work like manner according to OSHA standards
Know and follow the established safety rules at all times
Know and follow fire and emergency procedures

Assessment:

Interest Survey
Career Exploration Writing
Student Observation
- Class Oral Responses
- Teacher evaluating student class participation
- Graded Writing assignments
- Traditional Quizzes - multiple choice, matching, true/false, short answer completion
- Traditional Tests - multiple choice, matching, true/false, short answer completion
- Exit Slips
- Teacher observing and recording the quality of work being done on an assigned job
- WORK ETHIC
- SPECIAL NEEDS ASSESSMENT ADAPTATIONS:
- Study guides provided prior to tests
- Extended time to complete the assessment
- Word bank with no more than 10 options
- Word bank with no more than 5 options
- Multiple Choice will include 3 choices instead of 4

Resources/Equipment:

French & Helsel. (2003). Mechanical Drawing. Glencoe McGraw/Hill N.Y., N.Y. Spencer, Dygdon, Novak. (2000). Basic Technical Drawing. Glencoe McGraw/Hill N.Y. , N.Y. Kicklighter, Clois. (2000). Architecture, Residential Drawing and Design. Goodheart-Wilcox Co, Inc. N.Y., N.Y. Shrock, Cheryl R. (2009). Beginning AutoCAD 2009, Exercise Workbook. Industrial Press, NY. NY. Shrock, Cheryl R. (2013). Advanced AutoCAD 2013, Exercise Workbook. Industrial Press, NY. NY.Hyperlinks:

Monroe Career & Technical Institute

Course: Drafting and Design Technology

Unit Name: 200 INTRODUCTION TO DRAFTING AND DESIGN
Number: 200 **Hours:** 18.00
Dates: Spring 2025

Description/Objectives:

Student will know and be able to demonstrate the knowledge of basic board drafting tools and equipment and use of English and Metric scales.

Tasks:

PA201 - Identify basic board drafting tools and equipment, which are used to produce drawings.

PA203 - Use various types of scales (architectural, mechanical, and machining).

PA204 - Use the imperial and metric system of measurement to create a single view drawing.

PA205 - Identify components of a drawing.

Standards / Assessment Anchors
Focus Anchor/Standard #1:

- Pennsylvania Core Standards for Reading for Technical Subjects Standard 3.5

Supporting Anchor/Standards:

KEY IDEAS/DETAILS GRADES 9-10-11-12
Standard CC.3.5.9-10.A / Standard CC.3.5.11-12A Cite specific textual evidence, etc.
Standard CC.3.5.9-10 B / Standard CC.3.5.11-12 B Determine the central ideas or conclusions of a text; etc.
Standard CC.3.5.9-10.C / Standard CC.3.5.11-12.C Follow precisely a complex multistep procedure, etc.
CRAFT & STRUCTURE GRADES 9-10-11-12
Standard CC.3.5.9-10. D / Standard CC.3.5.11-12.D Determine the meaning of symbols, key terms, and other domain specific words.
Standard CC.3.5.9-10.E / Standard CC.3.5.11-12.E Analyze the structure of the relationships among concepts in a text, etc.
Standard CC.3.5.9-10.F / Standard CC.3.5.11-12.F Analyze the author’s purpose in providing an explanation, describing a procedure...and Analyze the structure of the relationships among concepts in a text.
INTEGRATE KNOWLEDGE & IDEAS GRADES 9-10
Standard CC.3.5.9-10.G Translate quantitative or technical information expressed in a text into visual form (e.g. a table or chart).
Standard CC.3.5.9-10. H Assess the reasoning in a text to support the author’s claim for solving a technical problem.
Standard CC.3.5.9-10. I Compare and contrast findings presented in a text to those from other sources, etc.
INTEGRATE KNOWLEDGE & IDEAS GRADES 11-12
Standard CC.3.5.11-12. G Integrate and evaluate multiple sources of information presented in diverse formats...to solve a problem.
Standard CC.3.5.11-12. H Evaluate the hypotheses, data, analysis, and conclusions in a technical text, verifying the data when possible.
Standard CC.3.5.11-12. I Synthesize information from a range of sources into a coherent understanding.
RANGE OF READING GRADES 9-10-11-12
Standard CC.3.5.9-10.J / Standard CC.3.5.11-12.J By the end of grades 9-10, AND 11- 12, read and comprehend technical texts independently and proficiently.

Supporting Anchor/Standards:

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Connecting Anchor/Standard:

- Pennsylvania Core Standards for Mathematics Standard 2.0

  Supporting Anchor/Standards:

  NUMBERS AND OPERATIONS
  Standard 2.1.HS.F.2 Apply properties of rational and irrational numbers to solve real world or mathematical problems.
  Standard 2.1.HS.F.4 Use units as a way to understand problems and to guide the solution of multistep problems.
  Standard 2.1.HS.F.5 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.
  Standard 2.1.HS.F.6 Extend the knowledge of arithmetic operations and apply to complex numbers
  ALGEBRA
  Standard 2.2.HS.C.9 Prove the Pythagorean identity and use it to calculate trigonometric ratios.
  GEOMETRY
  Standard 2.3.HS.A.7 Apply trigonometric ratios to solve problems involving right triangles.
  Standard 2.3.HS.A.3 Verify and apply geometric theorems as they relate to geometric figures.
  Standard 2.3.HS.A.13 Analyze relationships between two dimensional and three dimensional objects.

Instructional Activities:

Knowledge:
Participate in lecture and discussion
Maintain a portfolio
Participate in theory lesson and respond to questioning
Explain the importance of freehand sketching
Identify the thickness of lines used in sketching

Skill:
Describe the traditional and concurrent engineering design processes
Develop design ideas using freehand multi-view and pictorial sketches
Demonstrate the sketching of an arc, a circle and an ellipse
Develop techniques for estimating proportions

Remediation:
Review of chapter instruction
Individual instruction
Provide additional study guide
Relearn with additional instruction and retest
Reteach major concepts
Retest
Review with teacher assistance

Enrichment:
Computer research on related career choice
Competion practice
Special project

Special Adaptations:

- Extended Time (assignments and/or testing)
- Chunking of Assignments/Material
- Study Guide
- Use of Calculator
- Directions and/or Tests Read Aloud
- Preferential Seating
- Adapted Tests and/or Assignments

- Taking Tests in Alternate Setting (or if requested)
- Verbal/Gestural Redirection (prompts to remain on task)
- Use of Computer (Access to)
- Positive Reinforcement
- Wait Time
- Access to School Counselor

Safety:

Student must:
Follow manufacturer’s directions when using any product, tool, equipment, etc.
Use tools and equipment in a professional work like manner according to OSHA standards
Know and follow the established safety rules at all times
Know and follow fire and emergency procedures

Assessment:

Individual Projects
Portfolio
- Graded Writing assignments
- Traditional Quizzes - multiple choice, matching, true/false, short answer completion
- Traditional Tests - multiple choice, matching, true/false, short answer completion
- Exit Slips
- Teacher observing and recording the quality of work being done on an assigned job
- WORK ETHIC
- SPECIAL NEEDS ASSESSMENT ADAPTATIONS:
- Study guides provided prior to tests
- Extended time to complete the assessment
- Word bank with no more than 10 options
- Word bank with no more than 5 options
- Multiple Choice will include 3 choices instead of 4

Resources/Equipment:

Publications: American National Standards Institute, www.ANSI.ORG French & Helsel. (2003). Mechanical Drawing. Glencoe McGraw/Hill N.Y., N.Y. Spencer, Dygdon, Novak. (2000). Basic Technical Drawing. Glencoe McGraw/Hill N.Y., N.Y. Kicklighter, Clois. Architecture, Residential Drawing and Design. (2000). Goodheart-Wilcox Co, Inc. N.Y., N.Y. Shumaker/Madsen/Madsen, (2013). AutoCAD and Its Applications-Basics, Goodheart-Wilcox Co, Inc. N.Y., N.Y Shrock, Cheryl R. (2009). Beginning AutoCAD 2009, Exercise Workbook. Industrial Press, NY. NY. Shrock, Cheryl R. (2013). Advanced AutoCAD 2013, Exercise Workbook. Industrial Press, NY. NY. ComputerHyperlinks:

Monroe Career & Technical Institute

Course: Drafting and Design Technology

Unit Name: 300 GEOMETRIC CONSTRUCTION
Number: 300 **Hours:** 32.00
Dates: Spring 2025

Description/Objectives:

Student will know and be able to identify and describe various geometric shapes used by drafters. Student will also know and be able to solve technical and mathematical problems through geometric constructions using traditional drafting tools.

Tasks:

PA301 - Draw to scale.

PA302 - Draw geometric figures.

PA303 - Create drawings using geometric construction principles.

Standards / Assessment Anchors
Focus Anchor/Standard #1:

- Pennsylvania Core Standards for Reading for Technical Subjects Standard 3.5

Supporting Anchor/Standards:

KEY IDEAS/DETAILS GRADES 9-10-11-12
Standard CC.3.5.9-10.A / Standard CC.3.5.11-12A Cite specific textual evidence, etc.
Standard CC.3.5.9-10 B / Standard CC.3.5.11-12 B Determine the central ideas or conclusions of a text; etc.
Standard CC.3.5.9-10.C / Standard CC.3.5.11-12.C Follow precisely a complex multistep procedure, etc.
CRAFT & STRUCTURE GRADES 9-10-11-12
Standard CC.3.5.9-10. D / Standard CC.3.5.11-12.D Determine the meaning of symbols, key terms, and other domain specific words.
Standard CC.3.5.9-10.E / Standard CC.3.5.11-12.E Analyze the structure of the relationships among concepts in a text, etc.
Standard CC.3.5.9-10.F / Standard CC.3.5.11-12.F Analyze the author’s purpose in providing an explanation, describing a procedure...and Analyze the structure of the relationships among concepts in a text.
INTEGRATE KNOWLEDGE & IDEAS GRADES 9-10
Standard CC.3.5.9-10.G Translate quantitative or technical information expressed in a text into visual form (e.g. a table or chart).
Standard CC.3.5.9-10. H Assess the reasoning in a text to support the author’s claim for solving a technical problem.
Standard CC.3.5.9-10. I Compare and contrast findings presented in a text to those from other sources, etc.
INTEGRATE KNOWLEDGE & IDEAS GRADES 11-12
Standard CC.3.5.11-12. G Integrate and evaluate multiple sources of information presented in diverse formats...to solve a problem.
Standard CC.3.5.11-12. H Evaluate the hypotheses, data, analysis, and conclusions in a technical text, verifying the data when possible.
Standard CC.3.5.11-12. I Synthesize information from a range of sources into a coherent understanding.
RANGE OF READING GRADES 9-10-11-12
Standard CC.3.5.9-10.J / Standard CC.3.5.11-12.J By the end of grades 9-10, AND 11- 12, read and comprehend technical texts independently and proficiently.

Connecting Anchor/Standard:

- Pennsylvania Core Standards for Mathematics Standard 2.0

Supporting Anchor/Standards:

NUMBERS AND OPERATIONS

Standard 2.1.HS.F.2 Apply properties of rational and irrational numbers to solve real world or mathematical problems.

Standard 2.1.HS.F.4 Use units as a way to understand problems and to guide the solution of multistep problems.

Standard 2.1.HS.F.5 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

Standard 2.1.HS.F.6 Extend the knowledge of arithmetic operations and apply to complex numbers

ALGEBRA

Standard 2.2.HS.C.9 Prove the Pythagorean identity and use it to calculate trigonometric ratios.

GEOMETRY

Standard 2.3.HS.A.7 Apply trigonometric ratios to solve problems involving right triangles.

Standard 2.3.HS.A.3 Verify and apply geometric theorems as they relate to geometric figures.

Standard 2.3.HS.A.13 Analyze relationships between two dimensional and three dimensional objects.

Instructional Activities:

Knowledge:

Complete assigned textbook readings

Complete chapter written worksheets

Construct geometric shapes as assigned

Participate in lecture and discussion

Maintain a portfolio

Maintain time card records

Self evaluate based on rubric requirements

Review manufacturer's drawings and technical publications

Participate in theory lesson and respond to questioning

Identify and describe various geometric shapes and constructions used by drafters

Skill:

Construct various geometric shapes accurately

Solve technical and mathematical problems through geometric constructions using drafting instruments

Use geometry to reduce or enlarge a drawing or to change the proportions of a drawing

Demonstrate ability to identify and construct various geometric shapes:

Straight Line

Parallel Line

Intersecting Line

Part of a Circle

Concentric Circles

Eccentric Circles

Right Angle

Acute Angle

Obtuse Angle

Supplementary Angles

Complementary Angles

Supplementary Angles

Equilateral Triangle

Isosceles Triangle

Scalene Triangle

Right Triangle

Right Angles in Semi-circle

Tri-square in Semi-circle

Square

Rectangle

Rhombus

Rhomboid

Trapezoid

Trapezium

Pentagon
Hexagon
Heptagon
Octagon
Nonagon
Decagon
Dodecagon
Tetrahedron
Hexahedron
Octahedron
Dodecahedron
Icosahedron
Parallelepipeds (prisms)
Right Square
Oblique Rectangular
Right Rectangular
Right Triangular
Right Pentagonal
Oblique Pentagonal
Oblique Hexagonal
Cylinders
Right Cylinder
Oblique Cylinder
Pyramids
Right Triangular Pyramid
Right Square (Truncated) Pyramid
Cones
Oblique Pentagonal Cone
Oblique Circular (truncated) Cone
Sphere
Torus

Constructions:
Divide a line into equal parts
Enlarge or reduce figures
Bisect horizontal line
Bisect vertical line
Bisect a line
Bisect an arc
Bisect an angle
Copy an angle to a new location
Construct a triangle from a given side
Construct isosceles triangle
Construct equilateral triangles
Construct a right triangle
Construct an equilateral triangle
Construct a square
Construct a pentagon
Construct a hexagon
Construct an octagon
Draw Regular polygons
Draw a circle through three given points
Lay off an arc on a straight line
Draw a circle tangent to a line
Draw a line tangent to a circle
Draw an arc tangent to two straight lines
Draw an arc tangent to straight lines and arcs
Draw a "pin and string" ellipse
Draw a concentric-circle ellipse
Draw an approximate ellipse with a compass

Demonstrate ability to select and use the correct equipment for the task
Demonstrate ability to construct geometric shapes using traditional drawing equipment

Use mathematical values to construct geometric shapes with drafting instruments
Solve mathematical problems constructing geometric shapes using computer-aided-design software
Maintain work space
Check your work for completeness and accuracy

Remediation:
Review of chapter objectives
Individual instruction
Provide additional study guide
Relearn with additional instruction
Reteach major concepts
Review with teacher assistance
Retest

Enrichment:
Complete a special project
When a drawing construction is completed to 100% accuracy or to the best of the student's ability, the next drawing can be started
Summarize related articles on approved topic
Draw a trammel ellipse
Draw a foci ellipse

Special Adaptations:

- Extended Time (assignments and/or testing)
- Chunking of Assignments/Material
- Study Guide
- Use of Calculator
- Directions and/or Tests Read Aloud
- Preferential Seating
- Adapted Tests and/or Assignments
- Taking Tests in Alternate Setting (or if requested)
- Verbal/Gestural Redirection (prompts to remain on task)
- Use of Computer (Access to)
- Positive Reinforcement
- Wait Time
- Access to School Counselor

Safety:

Student must:
Follow manufacturer’s directions when using any product, tool, equipment, etc.
Use tools and equipment in a professional work like manner according to OSHA standards
Know and follow the established safety rules at all times
Know and follow fire and emergency procedures

Assessment:

- Graded Writing assignments
- Traditional Quizzes - multiple choice, matching, true/false, short answer completion
- Traditional Tests - multiple choice, matching, true/false, short answer completion
- Exit Slips
- Teacher observing and recording the quality of work being done on an assigned job
- WORK ETHIC
- SPECIAL NEEDS ASSESSMENT ADAPTATIONS:
- Study guides provided prior to tests
- Extended time to complete the assessment
- Word bank with no more than 10 options

- Word bank with no more than 5 options
- Multiple Choice will include 3 choices instead of 4

Resources/Equipment:

Internet Resources: Manufacturing - Website: engineersedge.com Construction - Website: tpub.com/content Publications: American National Standards Institute, www.ANSI.ORG French & Helsel. (2003). Mechanical Drawing. Glencoe McGraw/Hill N.Y., N.Y. Spencer, Dygdon, Novak. (2000). Basic Technical Drawing. Glencoe McGraw/Hill N.Y., N.Y. Kicklighter, Clois. Architecture, Residential Drawing and Design. (2000). Goodheart-Wilcox Co, Inc. N.Y., N.Y. Shumaker/Madsen/Madsen, (2013). AutoCAD and Its Applications-Basics, Goodheart-Wilcox Co, Inc. N.Y., N.Y Shrock, Cheryl R. (2009). Beginning AutoCAD 2009, Exercise Workbook. Industrial Press, NY. NY. Shrock, Cheryl R. (2013). Advanced AutoCAD 2013, Exercise Workbook. Industrial Press, NY. NY. ComputerHyperlinks:

Monroe Career & Technical Institute

Course: Drafting and Design Technology

Unit Name: 500 FREEHAND DRAWING AND SKETCHING
Number: 500 **Hours:** 76.00
Dates: Spring 2025

Description/Objectives:

Student will know and be able to provide ideas and communication by graphically constructing sketches.
Student will know proportion in the concept of sketching.

Tasks:

PA501 - Identify and sketch the alphabet of lines.

PA502 - Sketch orthographic views.

PA503 - Sketch an isometric drawing.

PA504 - Develop a perspective drawing using freehand methods.

PA507 - Express an idea using the sketching process.

PA508 - Create letters and numbers in single stroke capital letters (Gothic) on a technical sketch.

Standards / Assessment Anchors
Focus Anchor/Standard #1:

- Pennsylvania Core Standards for Reading for Technical Subjects Standard 3.5

Supporting Anchor/Standards:

KEY IDEAS/DETAILS GRADES 9-10-11-12
Standard CC.3.5.9-10.A / Standard CC.3.5.11-12A Cite specific textual evidence, etc.
Standard CC.3.5.9-10 B / Standard CC.3.5.11-12 B Determine the central ideas or conclusions of a text; etc.
Standard CC.3.5.9-10.C / Standard CC.3.5.11-12.C Follow precisely a complex multistep procedure, etc.
CRAFT & STRUCTURE GRADES 9-10-11-12
Standard CC.3.5.9-10. D / Standard CC.3.5.11-12.D Determine the meaning of symbols, key terms, and other domain specific words.
Standard CC.3.5.9-10.E / Standard CC.3.5.11-12.E Analyze the structure of the relationships among concepts in a text, etc.
Standard CC.3.5.9-10.F / Standard CC.3.5.11-12.F Analyze the author’s purpose in providing an explanation, describing a procedure...and Analyze the structure of the relationships among concepts in a text.
INTEGRATE KNOWLEDGE & IDEAS GRADES 9-10
Standard CC.3.5.9-10.G Translate quantitative or technical information expressed in a text into visual form (e.g. a table or chart).
Standard CC.3.5.9-10. H Assess the reasoning in a text to support the author’s claim for solving a technical problem.
Standard CC.3.5.9-10. I Compare and contrast findings presented in a text to those from other sources, etc.
INTEGRATE KNOWLEDGE & IDEAS GRADES 11-12
Standard CC.3.5.11-12. G Integrate and evaluate multiple sources of information presented in diverse formats...to solve a problem.
Standard CC.3.5.11-12. H Evaluate the hypotheses, data, analysis, and conclusions in a technical text, verifying the data when possible.
Standard CC.3.5.11-12. I Synthesize information from a range of sources into a coherent understanding.

RANGE OF READING GRADES 9-10-11-12
Standard CC.3.5.9-10.J / Standard CC.3.5.11-12.J By the end of grades 9-10, AND 11- 12, read and comprehend technical texts independently and proficiently.

Focus Anchor/Standard #2:

- Pennsylvania Core Standards for Writing for Technical Subjects Standard 3.6

Supporting Anchor/Standards:

TEXT TYPES AND PURPOSE GRADES 9-10-11-12
Standard CC.3.6.9-10.A Standard CC.3.6.11-12.A Write arguments focused on discipline specific content.
Standard CC.3.6.9-10.B Standard CC.3.6.11-12.B Write informative or explanatory texts, including the narration of technical processes, etc.
PRODUCTION & DISTRIBUTION OF WRITING GRADES 9-10-11-12
Standard CC.3.6.9-10.C Standard CC.3.6.11-12 C Produce clear and coherent writing...appropriate to task, purpose, and audience.
Standard CC.3.6.9-10 D Standard CC.3.6.11-12.D Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.
Standard CC.3.6.9-10.E Standard CC.3.6.11-12.E. Use technology, including the internet, to produce, publish, and update individual or shared writing products.
RESEARCH GRADES 9-10-11-12
Standard CC.3.6.9-10.F Standard CC.3.6.11-12.F Conduct short and more sustained research to answer a question or solve a problem.
Standard CC.3.6.9-10.G. Standard CC.3.6.11-12.G Gather relevant information from multiple authoritative print and digital sources, following a standard format for citation.
Standard CC.3.6.9-10.H. Standard CC.3.6.11-12.H. Draw evidence from informational texts to support analysis, reflection, and research.
RANGE OF WRITING GRADES 9-10-11-12
Standard CC.3.5.9-10.I & Standard CC.3.5.11-12.I. Write routinely over extended time frames and shorter time frames for a range of tasks, purposes and audiences...etc.

Connecting Anchor/Standard:

- Pennsylvania Core Standards for Mathematics Standard 2.0

Supporting Anchor/Standards:

NUMBERS AND OPERATIONS
Standard 2.1.HS.F.2 Apply properties of rational and irrational numbers to solve real world or mathematical problems.
Standard 2.1.HS.F.4 Use units as a way to understand problems and to guide the solution of multistep problems.
Standard 2.1.HS.F.5 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.
Standard 2.1.HS.F.6 Extend the knowledge of arithmetic operations and apply to complex numbers.
ALGEBRA
Standard 2.2.HS.C.9 Prove the Pythagorean identity and use it to calculate trigonometric ratios.

Instructional Activities:

Knowledge:
Explain the importance of creating technical sketches for communication
List reasons for constructing types of technical sketches: rough, refined and presentation
Explain the concept of tonal value using a hierarchy of lines
Review professional drawings and sketches
Complete assigned textbook readings
Complete assigned worksheets and study guides
Participate in theory lesson and respond to questioning
Self evaluate based on rubric requirements
Maintain a portfolio
Maintain time card records

Skill:
Demonstrate ability to select and use the correct equipment for the task
Show knowledge and use of traditional drawing equipment
Construct clear, freehand notes and sketches for a technical drawing
Construct develop ideas using sketches in functional design
Develop techniques for estimating proportions:
Graph paper and estimating spaces and distance
Self evaluate based on rubric requirements
Check your work for completeness and accuracy
Maintain work space
Sketch orthographic views.
Sketch an isometric drawing.
Develop a perspective drawing using freehand methods.

Remediation:
Review of chapter instruction
Individual instruction
Provide additional study guide
Relearn with additional instruction and retest
Reteach major concepts
Retest
Review with teacher assistance

Enrichment:
Complete a special project
Competition practice
Summarize related articles on approved topic

Special Adaptations:

- Extended Time (assignments and/or testing)
- Chunking of Assignments/Material
- Study Guide
- Use of Calculator
- Directions and/or Tests Read Aloud
- Preferential Seating
- Adapted Tests and/or Assignments
- Taking Tests in Alternate Setting (or if requested)
- Verbal/Gestural Redirection (prompts to remain on task)
- Use of Computer (Access to)
- Positive Reinforcement
- Wait Time
- Access to School Counselor

Safety:

Student must:
Follow manufacturer’s directions when using any product, tool, equipment, etc.
Use tools and equipment in a professional work like manner according to OSHA standards
Know and follow the established safety rules at all times
Know and follow fire and emergency procedures

Assessment:

- Graded Writing assignments
- Traditional Quizzes - multiple choice, matching, true/false, short answer completion
- Traditional Tests - multiple choice, matching, true/false, short answer completion
- Exit Slips
- Teacher observing and recording the quality of work being done on an assigned job

- WORK ETHIC
- SPECIAL NEEDS ASSESSMENT ADAPTATIONS:
- Study guides provided prior to tests
- Extended time to complete the assessment
- Word bank with no more than 10 options
- Word bank with no more than 5 options
- Multiple Choice will include 3 choices instead of 4

Resources/Equipment:

Drawing equipment: paper, pencils, erasers Publications: American National Standards Institute, www.ANSI.ORG French & Helsel. (2003). Mechanical Drawing. Glencoe McGraw/Hill N.Y., N.Y. Spencer, Dygdon, Novak. (2000). Basic Technical Drawing. Glencoe McGraw/Hill N.Y. N.Y. Shrock, Cheryl R. (2009). Beginning AutoCAD 2009, Exercise Workbook. Industrial Press, NY. NY. Shrock, Cheryl R. (2013). Advanced AutoCAD 2013, Exercise Workbook. Industrial Press, NY. NY. Computer CAD softwareHyperlinks:

Monroe Career & Technical Institute

Course: Drafting and Design Technology

Unit Name: 600 INTRODUCTION TO ENGINEERING MATH
Number: 600 **Hours:** 124.00
Dates: Spring 2025

Description/Objectives:

Student will know and be able to perform basic mathematical functions while constructing a multi-view drawing.

Tasks:

PA601 - Determine the scale of various drawings.

PA602 - Use basic applied mathematics to solve engineering problems.

PA603 - Construct lines using relative, absolute and polar coordinate systems.

PA604 - Establish the relationship among points, lines, and planes in 3-D space.

PA605 - Solve descriptive geometry problems.

Standards / Assessment Anchors
Focus Anchor/Standard #1:

- Pennsylvania Core Standards for Reading for Technical Subjects Standard 3.5

  Supporting Anchor/Standards:

  KEY IDEAS/DETAILS GRADES 9-10-11-12
  Standard CC.3.5.9-10.A / Standard CC.3.5.11-12A Cite specific textual evidence, etc.
  Standard CC.3.5.9-10 B / Standard CC.3.5.11-12 B Determine the central ideas or conclusions of a text; etc.
  Standard CC.3.5.9-10.C / Standard CC.3.5.11-12.C Follow precisely a complex multistep procedure, etc.
  CRAFT & STRUCTURE GRADES 9-10-11-12
  Standard CC.3.5.9-10. D / Standard CC.3.5.11-12.D Determine the meaning of symbols, key terms, and other domain specific words.
  Standard CC.3.5.9-10.E / Standard CC.3.5.11-12.E Analyze the structure of the relationships among concepts in a text, etc.
  Standard CC.3.5.9-10.F / Standard CC.3.5.11-12.F Analyze the author’s purpose in providing an explanation, describing a procedure...and Analyze the structure of the relationships among concepts in a text.
  INTEGRATE KNOWLEDGE & IDEAS GRADES 9-10
  Standard CC.3.5.9-10.G Translate quantitative or technical information expressed in a text into visual form (e.g. a table or chart).
  Standard CC.3.5.9-10. H Assess the reasoning in a text to support the author’s claim for solving a technical problem.
  Standard CC.3.5.9-10. I Compare and contrast findings presented in a text to those from other sources, etc.
  INTEGRATE KNOWLEDGE & IDEAS GRADES 11-12
  Standard CC.3.5.11-12. G Integrate and evaluate multiple sources of information presented in diverse formats...to solve a problem.
  Standard CC.3.5.11-12. H Evaluate the hypotheses, data, analysis, and conclusions in a technical text, verifying the data when possible.
  Standard CC.3.5.11-12. I Synthesize information from a range of sources into a coherent understanding.
  RANGE OF READING GRADES 9-10-11-12

Standard CC.3.5.9-10.J / Standard CC.3.5.11-12.J By the end of grades 9-10, AND 11- 12, read and comprehend technical texts independently and proficiently.

Supporting Anchor/Standards:

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Connecting Anchor/Standard:

- Pennsylvania Core Standards for Mathematics Standard 2.0

  Supporting Anchor/Standards:

  NUMBERS AND OPERATIONS
  Standard 2.1.HS.F.2 Apply properties of rational and irrational numbers to solve real world or mathematical problems.
  Standard 2.1.HS.F.4 Use units as a way to understand problems and to guide the solution of multistep problems.
  Standard 2.1.HS.F.5 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.
  Standard 2.1.HS.F.6 Extend the knowledge of arithmetic operations and apply to complex numbers
  ALGEBRA
  Standard 2.2.HS.C.9 Prove the Pythagorean identity and use it to calculate trigonometric ratios.
  GEOMETRY
  Standard 2.3.HS.A.7 Apply trigonometric ratios to solve problems involving right triangles.
  Standard 2.3.HS.A.3 Verify and apply geometric theorems as they relate to geometric figures.
  Standard 2.3.HS.A.13 Analyze relationships between two dimensional and three dimensional objects.

Instructional Activities:

Knowledge:
Complete assigned textbook readings
Complete assigned worksheets and study guides
Participate in lecture and discussion
Maintain a notebook
Self evaluate based on rubric requirements
Review manufacturer's drawings
Participate in theory lesson and respond to questioning

Skill:
Demonstrate ability to use various scales
Construct various geometric shapes accurately
Solve technical and mathematical problems through geometric constructions using drafting instruments
Solve technical and mathematic problems through geometric constructions using a CAD system
Use geometry to reduce or enlarge a drawing or to change the proportions of a drawing
Identify points in three-dimensional space
Identify and describe the three basic types of lines
Identify and describe the three basic types of planes
Establish the relationship among points, lines, and planes in 3D space
Manipulate points, lines, and planes in space to establish true positions, true sizes, and true shapes of features
Establish the true length of an oblique line
Determine the shortest distance between two geometric objects
Determine the true angle between lines or planes
Create points, lines, planes, and solids in 3D space using AutoCAD
Solve descriptive geometry problems using AutoCAD
Select the appropriate scales for architectural, civil and mechanical drawing
Develop techniques for estimating proportions

Use CAD commands efficiently to create basic geometry

Remediation:
Review of chapter instruction
Individual instruction
Provide additional study guide
Relearn with additional instruction and retest
Reteach major concepts
Retest
Review with teacher assistance

Enrichment:
Complete a special project
When a task is completed to 100% accuracy or to the best of the student's ability, the next task can be started
Summarize related articles on approved topic

Special Adaptations:

- Extended Time (assignments and/or testing)
- Chunking of Assignments/Material
- Study Guide
- Use of Calculator
- Directions and/or Tests Read Aloud
- Preferential Seating
- Adapted Tests and/or Assignments
- Taking Tests in Alternate Setting (or if requested)
- Verbal/Gestural Redirection (prompts to remain on task)
- Use of Computer (Access to)
- Positive Reinforcement
- Wait Time
- Access to School Counselor

Safety:

Student must:
Follow manufacturer’s directions when using any product, tool, equipment, etc.
Use tools and equipment in a professional work like manner according to OSHA standards
Know and follow the established safety rules at all times
Know and follow fire and emergency procedures

Assessment:

- Graded Writing assignments
- Traditional Quizzes - multiple choice, matching, true/false, short answer completion
- Traditional Tests - multiple choice, matching, true/false, short answer completion
- Exit Slips
- Teacher observing and recording the quality of work being done on an assigned job
- WORK ETHIC
- SPECIAL NEEDS ASSESSMENT ADAPTATIONS:
- Study guides provided prior to tests
- Extended time to complete the assessment
- Word bank with no more than 10 options
- Word bank with no more than 5 options
- Multiple Choice will include 3 choices instead of 4

Resources/Equipment:

Publications: American National Standards Institute, www.ANSI.ORG French & Helsel. (2003). Mechanical Drawing. Glencoe McGraw/Hill N.Y., N.Y. Spencer, Dygdon, Novak. (2000). Basic Technical Drawing. Glencoe McGraw/Hill N.Y. , N.Y. Shumaker/Madsen/Madsen. (2013). AutoCAD and Its Applications-Basics, Goodheart-Wilcox Co, Inc. N.Y., N.Y. Shrock, Cheryl R. (2009). Beginning AutoCAD 2009, Exercise Workbook. Industrial Press, NY. NY. Shrock, Cheryl R. (2013). Advanced AutoCAD 2013, Exercise Workbook. Industrial Press, NY. NY. Larkin, John and Duval C. (2013), Practical Problems, 4th edition, Clifton Park, NY: Thomson Delmar Learning. Computer CAD SoftwareHyperlinks:

Monroe Career & Technical Institute

Course: Drafting and Design Technology

Unit Name: 700 INTRODUCTION TO MECHANICAL DRAWING AND DESIGN
Number: 700 **Hours:** 149.00
Dates: Spring 2025

Description/Objectives:

Student will know and be able to identify and draw necessary orthographic views, draw auxiliary views, section views, threads and fasteners, and produce a BOM (parts list) and title block for an assembly. Student will know and be able to explain the relationship of orthographic projection to multi-view a drawing and demonstrate the knowledge of 3rd angle projection.

Tasks:

PA701 - Identify and draw necessary orthographic views.

PA702 - Explain the relationship of orthographic projection to multi-view drawing.

PA703 - Identify 1st angle and 3rd angle projection.

PA704 - Identify and draw auxiliary views.

PA705 - Identify and draw section views.

PA706 - Identify and draw threads and fasteners.

PA707 - Create working drawings (assembly, detail drawings, BOM)

PA708 - Create a title block on a mechanical drawing.0

PA709 - Identify and draw basic welding symbols.

PA710 - Reverse engineer a drawing from an existing part.

Standards / Assessment Anchors
Focus Anchor/Standard #1:

- Pennsylvania Core Standards for Reading for Technical Subjects Standard 3.5

Supporting Anchor/Standards:

KEY IDEAS/DETAILS GRADES 9-10-11-12
Standard CC.3.5.9-10.A / Standard CC.3.5.11-12A Cite specific textual evidence, etc.
Standard CC.3.5.9-10 B / Standard CC.3.5.11-12 B Determine the central ideas or conclusions of a text; etc.
Standard CC.3.5.9-10.C / Standard CC.3.5.11-12.C Follow precisely a complex multistep procedure, etc.
CRAFT & STRUCTURE GRADES 9-10-11-12
Standard CC.3.5.9-10. D / Standard CC.3.5.11-12.D Determine the meaning of symbols, key terms, and other domain specific words.
Standard CC.3.5.9-10.E / Standard CC.3.5.11-12.E Analyze the structure of the relationships among concepts in a text, etc.
Standard CC.3.5.9-10.F / Standard CC.3.5.11-12.F Analyze the author’s purpose in providing an explanation, describing a procedure...and Analyze the structure of the relationships among concepts in a text.
INTEGRATE KNOWLEDGE & IDEAS GRADES 9-10
Standard CC.3.5.9-10.G Translate quantitative or technical information expressed in a text into visual form (e.g. a table or chart).
Standard CC.3.5.9-10. H Assess the reasoning in a text to support the author’s claim for solving a

technical problem.
Standard CC.3.5.9-10. I Compare and contrast findings presented in a text to those from other sources, etc.
INTEGRATE KNOWLEDGE & IDEAS GRADES 11-12
Standard CC.3.5.11-12. G Integrate and evaluate multiple sources of information presented in diverse formats...to solve a problem.
Standard CC.3.5.11-12. H Evaluate the hypotheses, data, analysis, and conclusions in a technical text, verifying the data when possible.
Standard CC.3.5.11-12. I Synthesize information from a range of sources into a coherent understanding.
RANGE OF READING GRADES 9-10-11-12
Standard CC.3.5.9-10.J / Standard CC.3.5.11-12.J By the end of grades 9-10, AND 11- 12, read and comprehend technical texts independently and proficiently.

Focus Anchor/Standard #2:

- Pennsylvania Core Standards for Writing for Technical Subjects Standard 3.6

  Supporting Anchor/Standards:

  TEXT TYPES AND PURPOSE GRADES 9-10-11-12
  Standard CC.3.6.9-10.A Standard CC.3.6.11-12.A Write arguments focused on discipline specific content.
  Standard CC.3.6.9-10.B Standard CC.3.6.11-12.B Write informative or explanatory texts, including the narration of technical processes, etc.
  PRODUCTION & DISTRIBUTION OF WRITING GRADES 9-10-11-12
  Standard CC.3.6.9-10.C Standard CC.3.6.11-12 C Produce clear and coherent writing...appropriate to task, purpose, and audience.
  Standard CC.3.6.9-10 D Standard CC.3.6.11-12.D Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.
  Standard CC.3.6.9-10.E Standard CC.3.6.11-12.E. Use technology, including the internet, to produce, publish, and update individual or shared writing products.
  RESEARCH GRADES 9-10-11-12
  Standard CC.3.6.9-10.F Standard CC.3.6.11-12.F Conduct short and more sustained research to answer a question or solve a problem.
  Standard CC.3.6.9-10.G. Standard CC.3.6.11-12.G Gather relevant information from multiple authoritative print and digital sources, following a standard format for citation.
  Standard CC.3.6.9-10.H. Standard CC.3.6.11-12.H. Draw evidence from informational texts to support analysis, reflection, and research.
  RANGE OF WRITING GRADES 9-10-11-12
  Standard CC.3.5.9-10.I & Standard CC.3.5.11-12.I. Write routinely over extended time frames and shorter time frames for a range of tasks, purposes and audiences...etc.

Connecting Anchor/Standard:

- Pennsylvania Core Standards for Mathematics Standard 2.0

  Supporting Anchor/Standards:

  NUMBERS AND OPERATIONS
  Standard 2.1.HS.F.2 Apply properties of rational and irrational numbers to solve real world or mathematical problems.
  Standard 2.1.HS.F.4 Use units as a way to understand problems and to guide the solution of multistep problems.
  Standard 2.1.HS.F.5 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.
  Standard 2.1.HS.F.6 Extend the knowledge of arithmetic operations and apply to complex numbers
  ALGEBRA
  Standard 2.2.HS.C.9 Prove the Pythagorean identity and use it to calculate trigonometric ratios.
  GEOMETRY
  Standard 2.3.HS.A.7 Apply trigonometric ratios to solve problems involving right triangles.
  Standard 2.3.HS.A.3 Verify and apply geometric theorems as they relate to geometric figures.
  Standard 2.3.HS.A.13 Analyze relationships between two dimensional and three dimensional objects.

Instructional Activities:

Knowledge:
Explain the relationship of orthographic projection to multiview drawing
Describe the difference between first and third-angle projection
Determine the number of views necessary for a multiview drawing
Complete the assigned readings
Complete assigned worksheets and study guides
Participate in lecture and discussion
Maintain a notebook
Maintain time card records
Review professional drawings; mechanical and architectural
Participate in theory lesson and respond to questioning
Self evaluate based on rubric requirements
Student will identify various threads and fasteners.
Student will specify classes of thread fits.
Student will learn common screw-thread terms.
Student will identify threads and fasteners on a technical drawing.

Skill:
Demonstrate ability to construct drawings using various scales.
Demonstrate ability to select and use the correct equipment for the task.
Student will be able to locate and create the views of an object correctly on drawing.
Student will be able to determine the number of views to describe fully the shape and size of an object.
Student will know and be able to explain the relationship of orthographic projection to multi-view a drawing.
Student will develop a multi-view drawing from the initial idea to a finished drawing using board drafting and CAD techniques for: Birdhouse, Doghouse, Shed (CAD only), Garage (CAD only), Full House (CAD only).
Student will show ribs, webs, fasteners, and similar features in section.
Student will identify various threads and fasteners.
Student will define common screw-thread terms.
Student will specify threads and fasteners on a technical drawing.
Student will detailed, schematic and simplified thread representation.
Student will specify classes of thread fits.
Student will demonstrate the knowledge of 3rd angle projection.
Student will demonstrate ability to generate a Bill of Material (BOM.)
Student will demonstrate ability to generate a title block.
Student will show knowledge and use of traditional drawing equipment.
Student will show knowledge and use of computer-aided design software.
Student will maintain work space.
Student will check finished work for completeness and accuracy.

Remediation:
Review of chapter instruction
Individual instruction
Provide additional study guide
Relearn with additional instruction
Review with teacher assistance
Reteach major concepts
Retest

Enrichment:
Complete a special project
Competion practice
Computer research on approved topic

Special Adaptations:

- Extended Time (assignments and/or testing)
- Chunking of Assignments/Material
- Study Guide

- Use of Calculator
- Directions and/or Tests Read Aloud
- Preferential Seating
- Adapted Tests and/or Assignments
- Taking Tests in Alternate Setting (or if requested)
- Verbal/Gestural Redirection (prompts to remain on task)
- Use of Computer (Access to)
- Positive Reinforcement
- Wait Time
- Access to School Counselor

Safety:

Student must:
Follow manufacturer’s directions when using any product, tool, equipment, etc.
Use tools and equipment in a professional work like manner according to OSHA standards
Know and follow the established safety rules at all times
Know and follow fire and emergency procedures

Assessment:

- Graded Writing assignments
- Traditional Quizzes - multiple choice, matching, true/false, short answer completion
- Traditional Tests - multiple choice, matching, true/false, short answer completion
- Exit Slips
- Teacher observing and recording the quality of work being done on an assigned job
- WORK ETHIC
- SPECIAL NEEDS ASSESSMENT ADAPTATIONS:
- Study guides provided prior to tests
- Extended time to complete the assessment
- Word bank with no more than 10 options
- Word bank with no more than 5 options
- Multiple Choice will include 3 choices instead of 4

Resources/Equipment:

Publications: American National Standards Institute, www.ANSI.org French & Helsel. (2003). Mechanical Drawing. Glencoe McGraw/Hill N.Y., N.Y. Spencer, Dygdon, Novak. (2000). Basic Technical Drawing. Glencoe McGraw/Hill N.Y. N.Y. Shumaker/Madsen/Madsen. (2013). AutoCAD and Its Applications-Basics, Goodheart-Wilcox Co, Inc. N.Y., N.Y. Shrock, Cheryl R. (2009). Beginning AutoCAD 2009, Exercise Workbook. Industrial Press, NY. NY. Shrock, Cheryl R. (2013). Advanced AutoCAD 2013, Exercise Workbook. Industrial Press, NY. NY. Mechanical Drawing Instruments Copier Computer Autodesk Inc. Software, (AutoCAD current version)Hyperlinks:

Monroe Career & Technical Institute

Course: Drafting and Design Technology

Unit Name: 800 DIMENSIONING
Number: 800 **Hours:** 175.00
Dates: Spring 2025

Description/Objectives:

The student will apply measurements, notes, and symbols to a technical drawing using ANSI Standards for Dimensions, tolerances, and notes and ISO Standards for Dimensions and notes, also, specify dimensions tolerances using symbols and notes.

Sudent will know and be able to apply correct dimensioning technique to a working drawing according to the American National Standards Institute. The student will know the various different scales used between the fields of drafting.

Tasks:

PA801 - Apply measurements, notes, and symbols to a technical drawing.

PA802 - Apply ASME Standards for dimensions, tolerances, and notes.

PA803 - Apply ISO Standards for dimensions and notes.

Standards / Assessment Anchors
Focus Anchor/Standard #1:

- Pennsylvania Core Standards for Reading for Technical Subjects Standard 3.5

Supporting Anchor/Standards:

KEY IDEAS/DETAILS GRADES 9-10-11-12
Standard CC.3.5.9-10.A / Standard CC.3.5.11-12A Cite specific textual evidence, etc.
Standard CC.3.5.9-10 B / Standard CC.3.5.11-12 B Determine the central ideas or conclusions of a text; etc.
Standard CC.3.5.9-10.C / Standard CC.3.5.11-12.C Follow precisely a complex multistep procedure, etc.
CRAFT & STRUCTURE GRADES 9-10-11-12
Standard CC.3.5.9-10. D / Standard CC.3.5.11-12.D Determine the meaning of symbols, key terms, and other domain specific words.
Standard CC.3.5.9-10.E / Standard CC.3.5.11-12.E Analyze the structure of the relationships among concepts in a text, etc.
Standard CC.3.5.9-10.F / Standard CC.3.5.11-12.F Analyze the author’s purpose in providing an explanation, describing a procedure...and Analyze the structure of the relationships among concepts in a text.
INTEGRATE KNOWLEDGE & IDEAS GRADES 9-10
Standard CC.3.5.9-10.G Translate quantitative or technical information expressed in a text into visual form (e.g. a table or chart).
Standard CC.3.5.9-10. H Assess the reasoning in a text to support the author’s claim for solving a technical problem.
Standard CC.3.5.9-10. I Compare and contrast findings presented in a text to those from other sources, etc.
INTEGRATE KNOWLEDGE & IDEAS GRADES 11-12
Standard CC.3.5.11-12. G Integrate and evaluate multiple sources of information presented in diverse formats...to solve a problem.
Standard CC.3.5.11-12. H Evaluate the hypotheses, data, analysis, and conclusions in a technical text, verifying the data when possible.
Standard CC.3.5.11-12. I Synthesize information from a range of sources into a coherent

understanding.
RANGE OF READING GRADES 9-10-11-12
Standard CC.3.5.9-10.J / Standard CC.3.5.11-12.J By the end of grades 9-10, AND 11- 12, read and comprehend technical texts independently and proficiently.

Focus Anchor/Standard #2:

- Science, Technology & Engineering, and Environmental Literacy & Sustainability Standards
  3.5.9-12.1 Strand: Nature and Characteristics of Technology and Engineering

  Supporting Anchor/Standards:

  3.5.9-12.PP Demonstrate the use of conceptual, graphical, virtual, mathematical, and physical modeling to identify conflicting considerations before the entire system is developed and to aid in design decision making

  3.5.9-12.OO Use project management tools, strategies, and processes in planning, organizing, and controlling work.

  3.5.9-12.QQ Implement quality control as a planned process to ensure that a product, service, or system meets established criteria.

Connecting Anchor/Standard:

- Pennsylvania Core Standards for Mathematics Standard 2.0

  Supporting Anchor/Standards:

  NUMBERS AND OPERATIONS
  Standard 2.1.HS.F.2 Apply properties of rational and irrational numbers to solve real world or mathematical problems.
  Standard 2.1.HS.F.4 Use units as a way to understand problems and to guide the solution of multistep problems.
  Standard 2.1.HS.F.5 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.
  Standard 2.1.HS.F.6 Extend the knowledge of arithmetic operations and apply to complex numbers
  ALGEBRA
  Standard 2.2.HS.C.9 Prove the Pythagorean identity and use it to calculate trigonometric ratios.
  GEOMETRY
  Standard 2.3.HS.A.7 Apply trigonometric ratios to solve problems involving right triangles.
  Standard 2.3.HS.A.3 Verify and apply geometric theorems as they relate to geometric figures.
  Standard 2.3.HS.A.13 Analyze relationships between two dimensional and three dimensional objects.

Instructional Activities:

Knowledge:
Explain dimensioning standards based on ASME Y14.5M
Review manufacturer's drawings.
Participate in theory lesson and respond to questioning..
Demonstrate ability to provide dimensioning on related drawings.
Maintain a Portfolio.
Self evaluate based on rubric requirements.
Identify the four types of lines used in dimensioning.
Identify the correct methods of lettering decimal dimension figures.
Identify the correct dimensioning of arcs and angles.
Identify the correct placement of dimensions.
Identify the correct measurements, notes, and symbols to a technical drawing
Identify the use of ANSI and ISO standards for dimensions and notes
Differentiate between size dimensions and location dimensions
Determine appropriate sizes for precision fits between interchangeable mating parts

Specify geometric tolerances using symbols and notes
Designate appropriate surface textures
Use board drafting techniques to add dimensions, notes, and geometric tolerances to a technical drawing
Use a CAD system to add dimensions, notes and geometric tolerances to a technical drawing

Skill:
Apply measurements, notes, and symbols to a technical drawing
Demonstrate ability to label with local and general notes
Demonstrate ability to provide size and location dimensions on mechanical drawings
Demonstrate ability to select and use the correct equipment for the task
Show knowledge and use of traditional drawing equipment
Demonstrate ability to provide dimensions at various scales
Show knowledge and use of computer-aided design software
Check your work for completeness and accuracy
Demonstrate the correct methods of lettering decimal dimension figures.
Demonstrate the correct dimensioning of arcs and angles.
Demonstrate the correct placement of dimensions.
Apply measurements, notes, and symbols to a technical drawing
Use ANSI and ISO standards for dimensions and notes
Differentiate between size dimensions and location dimensions
Utilize the appropriate sizes for precision fits between interchangeable mating parts

Remediation:
Review of chapter instruction
Individual instruction
Provide additional study guide
Relearn with additional instruction
Reteach major concepts
Retest

Enrichment:
Complete a special project
Competion preperation
Summarize related articles on approved topic

Special Adaptations:

- Extended Time (assignments and/or testing)
- Chunking of Assignments/Material
- Study Guide
- Use of Calculator
- Directions and/or Tests Read Aloud
- Preferential Seating
- Adapted Tests and/or Assignments
- Taking Tests in Alternate Setting (or if requested)
- Verbal/Gestural Redirection (prompts to remain on task)
- Use of Computer (Access to)
- Positive Reinforcement
- Wait Time
- Access to School Counselor

Safety:

Student must:
Follow manufacturer’s directions when using any product, tool, equipment, etc.
Use tools and equipment in a professional work like manner according to OSHA standards
Know and follow the established safety rules at all times
Know and follow fire and emergency procedures

Assessment:

- Graded Writing assignments
- Traditional Quizzes - multiple choice, matching, true/false, short answer completion
- Traditional Tests - multiple choice, matching, true/false, short answer completion
- Exit Slips
- Teacher observing and recording the quality of work being done on an assigned job
- WORK ETHIC
- SPECIAL NEEDS ASSESSMENT ADAPTATIONS:
- Study guides provided prior to tests
- Extended time to complete the assessment
- Word bank with no more than 10 options
- Word bank with no more than 5 options
- Multiple Choice will include 3 choices instead of 4
- Portfolio

Resources/Equipment:

American National Standards Institute, www.ANSI.ORG French & Helsel. (2003). Mechanical Drawing. Glencoe McGraw/Hill N.Y., N.Y. Spencer, Dygdon, Novak. (2000). Basic Technical Drawing. Glencoe McGraw/Hill N.Y. N.Y. Kicklighter, Clois. Architecture, Residential Drawing and Design. (2000). Goodheart-Wilcox Co, Inc. N.Y., N.Y. Shumaker/Madsen/Madsen. (2013). AutoCAD and Its Applications-Basics, Goodheart-Wilcox Co, Inc. N.Y., N.Y. Shrock, Cheryl R. (2009). Beginning AutoCAD 2009, Exercise Workbook. Industrial Press, NY. NY. Shrock, Cheryl R. (2013). Advanced AutoCAD 2013, Exercise Workbook. Industrial Press, NY. NY. Computer Autodesk Inc. Software, (AutoCAD current version) Traditional drafting tools and equipment: pencils triangles erasers rulers Computer CAD softwareHyperlinks:

Monroe Career & Technical Institute

Course: Drafting and Design Technology

Unit Name: 900 INTRODUCTION TO ARCHITECTURE
Number: 900 **Hours:** 369.00
Dates: Spring 2025

Description/Objectives:

Student will know and be able to read, construct, and interpret architectural working drawings.

Tasks:

PA902 - Construct a floor plan.

PA903 - Construct an elevation.

PA904 - Construct a typical wall section.

PA905 - Draw a pictorial view.

PA907 - Construct an electrical plan.

PA908 - Apply ADA guidelines to an architectural set of floor plans.

Standards / Assessment Anchors
Focus Anchor/Standard #1:

- Pennsylvania Core Standards for Reading for Technical Subjects Standard 3.5

Supporting Anchor/Standards:

KEY IDEAS/DETAILS GRADES 9-10-11-12
Standard CC.3.5.9-10.A / Standard CC.3.5.11-12A Cite specific textual evidence, etc.
Standard CC.3.5.9-10 B / Standard CC.3.5.11-12 B Determine the central ideas or conclusions of a text; etc.
Standard CC.3.5.9-10.C / Standard CC.3.5.11-12.C Follow precisely a complex multistep procedure, etc.
CRAFT & STRUCTURE GRADES 9-10-11-12
Standard CC.3.5.9-10. D / Standard CC.3.5.11-12.D Determine the meaning of symbols, key terms, and other domain specific words.
Standard CC.3.5.9-10.E / Standard CC.3.5.11-12.E Analyze the structure of the relationships among concepts in a text, etc.
Standard CC.3.5.9-10.F / Standard CC.3.5.11-12.F Analyze the author’s purpose in providing an explanation, describing a procedure...and Analyze the structure of the relationships among concepts in a text.
INTEGRATE KNOWLEDGE & IDEAS GRADES 9-10
Standard CC.3.5.9-10.G Translate quantitative or technical information expressed in a text into visual form (e.g. a table or chart).
Standard CC.3.5.9-10. H Assess the reasoning in a text to support the author’s claim for solving a technical problem.
Standard CC.3.5.9-10. I Compare and contrast findings presented in a text to those from other sources, etc.
INTEGRATE KNOWLEDGE & IDEAS GRADES 11-12
Standard CC.3.5.11-12. G Integrate and evaluate multiple sources of information presented in diverse formats...to solve a problem.
Standard CC.3.5.11-12. H Evaluate the hypotheses, data, analysis, and conclusions in a technical text, verifying the data when possible.
Standard CC.3.5.11-12. I Synthesize information from a range of sources into a coherent understanding.

RANGE OF READING GRADES 9-10-11-12
Standard CC.3.5.9-10.J / Standard CC.3.5.11-12.J By the end of grades 9-10, AND 11- 12, read and comprehend technical texts independently and proficiently.

Focus Anchor/Standard #2:

- Pennsylvania Core Standards for Writing for Technical Subjects Standard 3.6

Supporting Anchor/Standards:

TEXT TYPES AND PURPOSE GRADES 9-10-11-12
Standard CC.3.6.9-10.A Standard CC.3.6.11-12.A Write arguments focused on discipline specific content.
Standard CC.3.6.9-10.B Standard CC.3.6.11-12.B Write informative or explanatory texts, including the narration of technical processes, etc.
PRODUCTION & DISTRIBUTION OF WRITING GRADES 9-10-11-12
Standard CC.3.6.9-10.C Standard CC.3.6.11-12 C Produce clear and coherent writing...appropriate to task, purpose, and audience.
Standard CC.3.6.9-10 D Standard CC.3.6.11-12.D Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.
Standard CC.3.6.9-10.E Standard CC.3.6.11-12.E. Use technology, including the internet, to produce, publish, and update individual or shared writing products.
RESEARCH GRADES 9-10-11-12
Standard CC.3.6.9-10.F Standard CC.3.6.11-12.F Conduct short and more sustained research to answer a question or solve a problem.
Standard CC.3.6.9-10.G. Standard CC.3.6.11-12.G Gather relevant information from multiple authoritative print and digital sources, following a standard format for citation.
Standard CC.3.6.9-10.H. Standard CC.3.6.11-12.H. Draw evidence from informational texts to support analysis, reflection, and research.
RANGE OF WRITING GRADES 9-10-11-12
Standard CC.3.5.9-10.I & Standard CC.3.5.11-12.I. Write routinely over extended time frames and shorter time frames for a range of tasks, purposes and audiences...etc.

Connecting Anchor/Standard:

- 7.RP.0 Ratios and Proportional Relationships

Supporting Anchor/Standards:

7.RP.CS Analyze proportional relationships and use them to solve real-world and mathematical problems.

7.RP.1 Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units.

7.RP.2 Recognize and represent proportional relationships between quantities.

Instructional Activities:

Knowledge:
Construct a set of Working Drawings to include: Floor plan(s), Elevation(s)
Wall Sections, and Building Sections

Details for Special Construction such as:
walls, doors and windows in plan using standard architectural symbols.
Details of a jamb, head and sill at correct scale.
Details of material in plan, elevation and section.
Standard Architectural symbols
Standard Plumbing symbols
Standard Architectural symbols
Standard Architectural Abbreviations
A door schedule,

A window schedule
Terminology
Complete assigned textbook readings
Complete assigned worksheets and study guides
Participate in lecture and discussion
Maintain a notebook
Maintain time card records
Self evaluate based on rubric requirements
Review manufacturer's drawings and technical publications
Participate in theory lesson and respond to questioning

Skill:
Demonstrate ability to select and use the correct equipment for the task
Demonstrate ability to construct related drawings using traditional drawing equipment
Demonstrate ability to construct details at various scales
Show knowledge and use of computer-aided design software
Demonstrate knowledge of construction of working drawings; floor plans, elevation sections and details
Show ability to identify and illustrate material used in composite construction
Check your work for completeness and accuracy
Maintain work space

Remediation:
Review of chapter objectives
Individual instruction
Provide additional study guide
Relearn with additional instruction
Reteach major concepts
Review with teacher assistance
Retest

Enrichment:
Complete a special project
Competitive practice
Summarize related articles on approved topic

Special Adaptations:

- Extended Time (assignments and/or testing)
- Chunking of Assignments/Material
- Study Guide
- Use of Calculator
- Directions and/or Tests Read Aloud
- Preferential Seating
- Adapted Tests and/or Assignments
- Taking Tests in Alternate Setting (or if requested)
- Verbal/Gestural Redirection (prompts to remain on task)
- Use of Computer (Access to)
- Positive Reinforcement
- Wait Time
- Access to School Counselor

Safety:

Student must:
Follow manufacturer’s directions when using any product, tool, equipment, etc.
Use tools and equipment in a professional work like manner according to OSHA standards
Know and follow the established safety rules at all times
Know and follow fire and emergency procedures

Assessment:

- Graded Writing assignments
- Traditional Quizzes - multiple choice, matching, true/false, short answer completion
- Traditional Tests - multiple choice, matching, true/false, short answer completion
- Exit Slips
- Teacher observing and recording the quality of work being done on an assigned job
- WORK ETHIC
- SPECIAL NEEDS ASSESSMENT ADAPTATIONS:
- Study guides provided prior to tests
- Extended time to complete the assessment
- Word bank with no more than 10 options
- Word bank with no more than 5 options
- Multiple Choice will include 3 choices instead of 4

Resources/Equipment:

Kicklighter, Clois. Architecture, Residential Drawing and Design. (2000). Goodheart-Wilcox Co, Inc. N.Y., N.Y. Shumaker/Madsen/Madsen. (2013). AutoCAD and Its Applications-Basics, Goodheart-Wilcox Co, Inc. N.Y., N.Y Shrock, Cheryl R. (2009). Beginning AutoCAD 2009, Exercise Workbook. Industrial Press, NY. NY. Shrock, Cheryl R. (2013). Advanced AutoCAD 2013, Exercise Workbook. Industrial Press, NY. NY. Blueprint Machine Copier Computer Autodesk Inc. Software, (AutoCAD current version) Sketching material (selected paper, pencil and eraser) Scale Ruler Drawing tableHyperlinks:

Monroe Career & Technical Institute

Course: Drafting and Design Technology

Unit Name: 1000 INTRODUCTION TO CIVIL DRAFTING
Number: 1000 **Hours:** 60.00
Dates: Spring 2025

Description/Objectives:

Student will know drafting standards and fundamentals and be able to construct a site plan.

Tasks:

PA1001 - Construct a site plan.

PA1005 - Identify survey and/or GPS equipment.

PA1006 - Identify the elements used to create a Civil design plan.

PA1007 - Read and interpret a deed.

Standards / Assessment Anchors
Focus Anchor/Standard #1:

- Pennsylvania Core Standards for Reading for Technical Subjects Standard 3.5

Supporting Anchor/Standards:

KEY IDEAS/DETAILS GRADES 9-10-11-12
Standard CC.3.5.9-10.A / Standard CC.3.5.11-12A Cite specific textual evidence, etc.
Standard CC.3.5.9-10 B / Standard CC.3.5.11-12 B Determine the central ideas or conclusions of a text; etc.
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Standard CC.3.5.9-10. D / Standard CC.3.5.11-12.D Determine the meaning of symbols, key terms, and other domain specific words.
Standard CC.3.5.9-10.E / Standard CC.3.5.11-12.E Analyze the structure of the relationships among concepts in a text, etc.
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INTEGRATE KNOWLEDGE & IDEAS GRADES 9-10
Standard CC.3.5.9-10.G Translate quantitative or technical information expressed in a text into visual form (e.g. a table or chart).
Standard CC.3.5.9-10. H Assess the reasoning in a text to support the author’s claim for solving a technical problem.
Standard CC.3.5.9-10. I Compare and contrast findings presented in a text to those from other sources, etc.
INTEGRATE KNOWLEDGE & IDEAS GRADES 11-12
Standard CC.3.5.11-12. G Integrate and evaluate multiple sources of information presented in diverse formats...to solve a problem.
Standard CC.3.5.11-12. H Evaluate the hypotheses, data, analysis, and conclusions in a technical text, verifying the data when possible.
Standard CC.3.5.11-12. I Synthesize information from a range of sources into a coherent understanding.
RANGE OF READING GRADES 9-10-11-12
Standard CC.3.5.9-10.J / Standard CC.3.5.11-12.J By the end of grades 9-10, AND 11- 12, read and comprehend technical texts independently and proficiently.

Focus Anchor/Standard #2:

- Pennsylvania Core Standards for Writing for Technical Subjects Standard 3.6

  Supporting Anchor/Standards:

  TEXT TYPES AND PURPOSE GRADES 9-10-11-12
  Standard CC.3.6.9-10.A Standard CC.3.6.11-12.A Write arguments focused on discipline specific content.
  Standard CC.3.6.9-10.B Standard CC.3.6.11-12.B Write informative or explanatory texts, including the narration of technical processes, etc.
  PRODUCTION & DISTRIBUTION OF WRITING GRADES 9-10-11-12
  Standard CC.3.6.9-10.C Standard CC.3.6.11-12 C Produce clear and coherent writing...appropriate to task, purpose, and audience.
  Standard CC.3.6.9-10 D Standard CC.3.6.11-12.D Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.
  Standard CC.3.6.9-10.E Standard CC.3.6.11-12.E. Use technology, including the internet, to produce, publish, and update individual or shared writing products.
  RESEARCH GRADES 9-10-11-12
  Standard CC.3.6.9-10.F Standard CC.3.6.11-12.F Conduct short and more sustained research to answer a question or solve a problem.
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  Standard CC.3.6.9-10.H. Standard CC.3.6.11-12.H. Draw evidence from informational texts to support analysis, reflection, and research.
  RANGE OF WRITING GRADES 9-10-11-12
  Standard CC.3.5.9-10.I & Standard CC.3.5.11-12.I. Write routinely over extended time frames and shorter time frames for a range of tasks, purposes and audiences...etc.

Connecting Anchor/Standard:

- Pennsylvania Core Standards for Mathematics Standard 2.0

  Supporting Anchor/Standards:

  NUMBERS AND OPERATIONS
  Standard 2.1.HS.F.2 Apply properties of rational and irrational numbers to solve real world or mathematical problems.
  Standard 2.1.HS.F.4 Use units as a way to understand problems and to guide the solution of multistep problems.
  Standard 2.1.HS.F.5 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.
  Standard 2.1.HS.F.6 Extend the knowledge of arithmetic operations and apply to complex numbers
  ALGEBRA
  Standard 2.2.HS.C.9 Prove the Pythagorean identity and use it to calculate trigonometric ratios.
  GEOMETRY
  Standard 2.3.HS.A.7 Apply trigonometric ratios to solve problems involving right triangles.
  Standard 2.3.HS.A.3 Verify and apply geometric theorems as they relate to geometric figures.
  Standard 2.3.HS.A.13 Analyze relationships between two dimensional and three dimensional objects.

Instructional Activities:

Knowledge:
Identify terminology
Identify units of measure
Identify scales of drawing
Identify topographical symbols
Identify angles, bearings and azimuths
Will correctly identify notes on drawings
Survey a site (practical or theoretical)
Maintain a notebook for plot plan project
Maintain time card records
Self evaluate based on rubric requirements
Review plot plan drawings and technical publications

Skill:
Demonstrate ability to use various scales
Demonstrate ability to select and use the correct equipment for the task
Demonstrate ability to construct related drawings using traditional drawing equipment
Show knowledge and use of computer-aided design software
Maintain work space
Check your work for completeness and accuracy
Draw and identify topographical symbols
Construct a plot plan and sub-division plan
Construct a site profile
Utilize bearings to identify the property lines.

Remediation:
Review of chapter objectives
Individual instruction
Provide additional study guide
Relearn with additional instruction
Reteach major concepts
Review with teacher assistance
Retest

Enrichment:
Complete a special project
Competion practice
Summarize related articles on approved topic

Special Adaptations:

- Extended Time (assignments and/or testing)
- Chunking of Assignments/Material
- Study Guide
- Use of Calculator
- Directions and/or Tests Read Aloud
- Preferential Seating
- Adapted Tests and/or Assignments
- Taking Tests in Alternate Setting (or if requested)
- Verbal/Gestural Redirection (prompts to remain on task)
- Use of Computer (Access to)
- Positive Reinforcement
- Wait Time
- Access to School Counselor

Safety:

Student must:
Follow manufacturer’s directions when using any product, tool, equipment, etc.
Use tools and equipment in a professional work like manner according to OSHA standards
Know and follow the established safety rules at all times
Know and follow fire and emergency procedures

Assessment:

- Graded Writing assignments
- Traditional Quizzes - multiple choice, matching, true/false, short answer completion
- Traditional Tests - multiple choice, matching, true/false, short answer completion
- Exit Slips
- Teacher observing and recording the quality of work being done on an assigned job
- WORK ETHIC
- SPECIAL NEEDS ASSESSMENT ADAPTATIONS:

- Study guides provided prior to tests
- Extended time to complete the assessment
- Word bank with no more than 10 options
- Word bank with no more than 5 options
- Multiple Choice will include 3 choices instead of 4

Resources/Equipment:

American National Standards Institute, www.ANSI.ORG French & Helsel. (2003). Mechanical Drawing. Glencoe McGraw/Hill N.Y., N.Y. Spencer, Dygdon, Novak. (2000). Basic Technical Drawing. Glencoe McGraw/Hill N.Y. N.Y. Kicklighter, Clois. Architecture, Residential Drawing and Design. (2000). Goodheart-Wilcox Co, Inc. N.Y., N.Y. Shumaker/Madsen/Madsen. (2013). AutoCAD and Its Applications-Basics, Goodheart-Wilcox Co, Inc. N.Y., N.Y. Shrock, Cheryl R. (2009). Beginning AutoCAD 2009, Exercise Workbook. Industrial Press, NY. NY. Shrock, Cheryl R. (2013). Advanced AutoCAD 2013, Exercise Workbook. Industrial Press, NY. NY. Autodesk Inc. Software, (AutoCAD current version)Hyperlinks:

Monroe Career & Technical Institute

Course: Drafting and Design Technology

Unit Name: 1100 INTRODUCTION TO ELECTRICAL AND ELECTRONIC DRAFTING
Number: 1100 **Hours:** 40.00
Dates: Spring 2025

Description/Objectives:

Student will know and be able to apply and use electrical and electronic symbols to construct a schematic wiring diagram.

Tasks:

PA1101 - Identify and describe various symbols.

Standards / Assessment Anchors

Focus Anchor/Standard #1:

- Pennsylvania Core Standards for Reading for Technical Subjects Standard 3.5

Supporting Anchor/Standards:

KEY IDEAS/DETAILS GRADES 9-10-11-12
Standard CC.3.5.9-10.A / Standard CC.3.5.11-12A Cite specific textual evidence, etc.
Standard CC.3.5.9-10 B / Standard CC.3.5.11-12 B Determine the central ideas or conclusions of a text; etc.
Standard CC.3.5.9-10.C / Standard CC.3.5.11-12.C Follow precisely a complex multistep procedure, etc.
CRAFT & STRUCTURE GRADES 9-10-11-12
Standard CC.3.5.9-10. D / Standard CC.3.5.11-12.D Determine the meaning of symbols, key terms, and other domain specific words.
Standard CC.3.5.9-10.E / Standard CC.3.5.11-12.E Analyze the structure of the relationships among concepts in a text, etc.
Standard CC.3.5.9-10.F / Standard CC.3.5.11-12.F Analyze the author's purpose in providing an explanation, describing a procedure...and Analyze the structure of the relationships among concepts in a text.
INTEGRATE KNOWLEDGE & IDEAS GRADES 9-10
Standard CC.3.5.9-10.G Translate quantitative or technical information expressed in a text into visual form (e.g. a table or chart).
Standard CC.3.5.9-10. H Assess the reasoning in a text to support the author's claim for solving a technical problem.
Standard CC.3.5.9-10. I Compare and contrast findings presented in a text to those from other sources, etc.
INTEGRATE KNOWLEDGE & IDEAS GRADES 11-12
Standard CC.3.5.11-12. G Integrate and evaluate multiple sources of information presented in diverse formats...to solve a problem.
Standard CC.3.5.11-12. H Evaluate the hypotheses, data, analysis, and conclusions in a technical text, verifying the data when possible.
Standard CC.3.5.11-12. I Synthesize information from a range of sources into a coherent understanding.
RANGE OF READING GRADES 9-10-11-12
Standard CC.3.5.9-10.J / Standard CC.3.5.11-12.J By the end of grades 9-10, AND 11- 12, read and comprehend technical texts independently and proficiently.

Focus Anchor/Standard #2:

- Pennsylvania Core Standards for Writing for Technical Subjects Standard 3.6

Supporting Anchor/Standards:

TEXT TYPES AND PURPOSE GRADES 9-10-11-12
Standard CC.3.6.9-10.A Standard CC.3.6.11-12.A Write arguments focused on discipline specific

content.
Standard CC.3.6.9-10.B Standard CC.3.6.11-12.B Write informative or explanatory texts, including the narration of technical processes, etc.
PRODUCTION & DISTRIBUTION OF WRITING GRADES 9-10-11-12
Standard CC.3.6.9-10.C Standard CC.3.6.11-12 C Produce clear and coherent writing...appropriate to task, purpose, and audience.
Standard CC.3.6.9-10 D Standard CC.3.6.11-12.D Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.
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RESEARCH GRADES 9-10-11-12
Standard CC.3.6.9-10.F Standard CC.3.6.11-12.F Conduct short and more sustained research to answer a question or solve a problem.
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Standard CC.3.6.9-10.H. Standard CC.3.6.11-12.H. Draw evidence from informational texts to support analysis, reflection, and research.
RANGE OF WRITING GRADES 9-10-11-12
Standard CC.3.5.9-10.I & Standard CC.3.5.11-12.I. Write routinely over extended time frames and shorter time frames for a range of tasks, purposes and audiences...etc.

Instructional Activities:

Knowledge:
Complete assigned worksheets and study guides
Know and define electrical terminology
Learn to draw types of circuits
Self evaluate based on rubric requirements
Review manufacturer's drawings and technical publications
Participate in theory lesson and respond to questioning
Maintain a Portfolio
Maintain time card records

Skill:
Demonstrate knowledge of related electronic component symbols.
Draw an electrical schematic utilizing proper symbols.
Demonstrate ability to select and use the correct equipment for the task.
Demonstrate ability to construct related drawings using traditional drawing equipment.
Show knowledge and use of computer-aided design software.
Check your work for completeness and accuracy.
Maintain work space.

Remediation:
Review of chapter objectives
Individual instruction
Provide additional study guide
Relearn with additional instruction
Reteach major concepts
Review with teacher assistance
Retest

Enrichment:
Complete a special project
Competition pratice
Summarize related articles on approved topic

Special Adaptations:

- Extended Time (assignments and/or testing)
- Chunking of Assignments/Material

- Study Guide
- Use of Calculator
- Directions and/or Tests Read Aloud
- Preferential Seating
- Adapted Tests and/or Assignments
- Taking Tests in Alternate Setting (or if requested)
- Verbal/Gestural Redirection (prompts to remain on task)
- Use of Computer (Access to)
- Positive Reinforcement
- Wait Time
- Access to School Counselor

Safety:

Student must:
Follow manufacturer’s directions when using any product, tool, equipment, etc.
Use tools and equipment in a professional work like manner according to OSHA standards
Know and follow the established safety rules at all times
Know and follow fire and emergency procedures

Assessment:

- Graded Writing assignments
- Traditional Quizzes - multiple choice, matching, true/false, short answer completion
- Traditional Tests - multiple choice, matching, true/false, short answer completion
- Exit Slips
- Teacher observing and recording the quality of work being done on an assigned job
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- Word bank with no more than 10 options
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Resources/Equipment:

Publications: American National Standards Institute, www.ANSI.ORG French & Helsel. (2003). Mechanical Drawing. Glencoe McGraw/Hill N.Y., N.Y. Spencer, Dygdon, Novak. (2000). Basic Technical Drawing. Glencoe McGraw/Hill N.Y. N.Y. Kicklighter, Clois. Architecture, Residential Drawing and Design. (2000). Goodheart-Wilcox Co, Inc. N.Y., N.Y. Shumaker/Madsen/Madsen, (2013). AutoCAD and Its Applications-Basics, Goodheart-Wilcox Co, Inc. N.Y., N.Y. Shrock, Cheryl R. (2009). Beginning AutoCAD 2009, Exercise Workbook. Industrial Press, NY. NY. Shrock, Cheryl R. (2013). Advanced AutoCAD 2013, Exercise Workbook. Industrial Press, NY. NY. Computer CAD softwareHyperlinks:

Monroe Career & Technical Institute

Course: Drafting and Design Technology

Unit Name: 1200 COMPUTER ASSISTED DRAFTING (CAD)
Number: 1200 **Hours:** 298.00
Dates: Spring 2025

Description/Objectives:

Student will be know and be able to demonstrate how to use computer-aided drafting to produce two-dimensional drawings and three-dimensional models, plot printing, and drawing management. Student will utilize CAD system commands for rendering, surface models, a drafting library, and viewing tools.

Tasks:

PA1201 - Utilize input and output devices such as printers, plotters, etc.

PA1202 - Use drawing aids and controls.

PA1203 - Use drawing and editing tools.

PA1204 - Use viewing tools.

PA1205 - Utilize a commercially built drafting library.

PA1206 - Produce a custom built drafting library.

PA1207 - Make a revision to an existing drawing.

PA1208 - Configure and use dimensions and tolerances.

PA1209 - Create 3-dimensional models.

PA1211 - Create parametric solid models.

PA1212 - Render a drawing.

PA1213 - Import, export and link drawings.

PA1214 - Manage and store files.

PA1215 - Use rapid prototyping.

PA1216 - Draw, modify and apply text justifications on a CAD system.

Standards / Assessment Anchors
Focus Anchor/Standard #1:

- Pennsylvania Core Standards for Reading for Technical Subjects Standard 3.5

  Supporting Anchor/Standards:
  KEY IDEAS/DETAILS GRADES 9-10-11-12
  Standard CC.3.5.9-10.A / Standard CC.3.5.11-12A Cite specific textual evidence, etc.
  Standard CC.3.5.9-10 B / Standard CC.3.5.11-12 B Determine the central ideas or conclusions of a text; etc.
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  CRAFT & STRUCTURE GRADES 9-10-11-12
  Standard CC.3.5.9-10. D / Standard CC.3.5.11-12.D Determine the meaning of symbols, key terms, and other domain specific words.

Standard CC.3.5.9-10.E / Standard CC.3.5.11-12.E Analyze the structure of the relationships among concepts in a text, etc.
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INTEGRATE KNOWLEDGE & IDEAS GRADES 9-10
Standard CC.3.5.9-10.G Translate quantitative or technical information expressed in a text into visual form (e.g. a table or chart).
Standard CC.3.5.9-10. H Assess the reasoning in a text to support the author's claim for solving a technical problem.
Standard CC.3.5.9-10. I Compare and contrast findings presented in a text to those from other sources, etc.
INTEGRATE KNOWLEDGE & IDEAS GRADES 11-12
Standard CC.3.5.11-12. G Integrate and evaluate multiple sources of information presented in diverse formats...to solve a problem.
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Standard CC.3.5.11-12. I Synthesize information from a range of sources into a coherent understanding.
RANGE OF READING GRADES 9-10-11-12
Standard CC.3.5.9-10.J / Standard CC.3.5.11-12.J By the end of grades 9-10, AND 11- 12, read and comprehend technical texts independently and proficiently.

Focus Anchor/Standard #2:

- 3.5.9-12.4 Strand: Design in Technology & Engineering Education

  Supporting Anchor/Standards:

  3.5.9-12.P Apply a broad range of design skills to a design thinking process

  3.5.9-12.U Evaluate and define the purpose of a design

Connecting Anchor/Standard:

- Pennsylvania Core Standards for Mathematics Standard 2.0

  Supporting Anchor/Standards:

  NUMBERS AND OPERATIONS
  Standard 2.1.HS.F.2 Apply properties of rational and irrational numbers to solve real world or mathematical problems.
  Standard 2.1.HS.F.4 Use units as a way to understand problems and to guide the solution of multistep problems.
  Standard 2.1.HS.F.5 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.
  Standard 2.1.HS.F.6 Extend the knowledge of arithmetic operations and apply to complex numbers
  ALGEBRA
  Standard 2.2.HS.C.9 Prove the Pythagorean identity and use it to calculate trigonometric ratios.
  GEOMETRY
  Standard 2.3.HS.A.7 Apply trigonometric ratios to solve problems involving right triangles.
  Standard 2.3.HS.A.3 Verify and apply geometric theorems as they relate to geometric figures.

Instructional Activities:

Knowledge:
Learn AutoCAD terminology
Learn the required hardware
Demonstrate ability to load software
Learn basic drawing commands
Learn to use edit and modify commands
Learn file saving
Learn to print and plot drawings
Learn advanced drawing commands

Learn 3-D concept
Complete assigned textbook readings
Complete assigned worksheets and study guides
Participate in lecture and discussion
Maintain a notebook
Maintain time card records
Self evaluate based on rubric requirements
Review manufacturer's drawings and technical publications
Participate in theory lesson and respond to questioning
Utilize input and output devices such as printers, plotters, etc.
Identify drawing aids and controls.
Identify drawing and editing tools.
Identify viewing tools.
Identify a commercially built drafting library.
Identify a custom built drafting library.
Identify a revision to an existing drawing.
Identify dimensions and tolerances.
Identify 3-dimensional drawings and models.
Identify surface models.
Identify parametric solid models.
Identify a rendering.
Identify rapid prototyping.
Understand management and storage of files.

Skill:
Demonstrate ability to use various scales
Check your work for completeness and accuracy
Demonstrate ability to select and use the correct equipment for the task
Demonstrate ability to construct related drawings using traditional drawing equipment
Show knowledge and use of computer-aided design software
Maintain work space
Utilize input and output devices such as printers, plotters, etc.
Demonstrate the use of drawing aids and controls.
Use drawing and editing tools.
Use viewing tools.
Utilize a commercially built drafting library.
Produce a custom built drafting library.
Make a revision to an existing drawing.
Configure and use dimensions and tolerances.
Create 3-dimensional drawings and models.
Create surface models.
Create parametric solid models.
Demonstrate rendering.
Demonstrate importing, exporting, and linking of drawings.
Demonstrate knowledge of rapid prototyping.

Remediation:
Review of chapter objectives
Individual instruction
Provide additional study guide
Relearn with additional instruction
Reteach major concepts and retest
Review with teacher assistance

Enrichment:
Complete a special project
Competition practice
Summarize related articles on approved topic

Special Adaptations:

- Extended Time (assignments and/or testing)
- Chunking of Assignments/Material
- Study Guide
- Use of Calculator
- Directions and/or Tests Read Aloud
- Preferential Seating
- Adapted Tests and/or Assignments
- Taking Tests in Alternate Setting (or if requested)
- Verbal/Gestural Redirection (prompts to remain on task)
- Use of Computer (Access to)
- Positive Reinforcement
- Wait Time
- Access to School Counselor

Safety:

Student must:
Follow manufacturer’s directions when using any product, tool, equipment, etc.
Use tools and equipment in a professional work like manner according to OSHA standards
Know and follow the established safety rules at all times
Know and follow fire and emergency procedures

Assessment:

- Graded Writing assignments
- Traditional Quizzes - multiple choice, matching, true/false, short answer completion
- Traditional Tests - multiple choice, matching, true/false, short answer completion
- Exit Slips
- Teacher observing and recording the quality of work being done on an assigned job
- WORK ETHIC
- SPECIAL NEEDS ASSESSMENT ADAPTATIONS:
- Study guides provided prior to tests
- Extended time to complete the assessment
- Word bank with no more than 10 options
- Word bank with no more than 5 options
- Multiple Choice will include 3 choices instead of 4

Resources/Equipment:

Publications: www.autocad.com/ Shumaker/Madsen/Madsen. (2013). AutoCAD and Its Applications-Basics, Goodheart-Wilcox Co, Inc. N.Y., N.Y. Shrock, Cheryl R. (2009). Beginning AutoCAD 2009, Exercise Workbook. Industrial Press, NY. NY. Shrock, Cheryl R. (2013). Advanced AutoCAD 2013, Exercise Workbook. Industrial Press, NY. NY. Computer Autodesk Inc. Software, (AutoCAD current version)Hyperlinks: