Wallenpaupack Area School District Planned Course Curriculum Guide

Career and Technical Education

Engineering Technologies I

Course Description:
Engineering Technologies I is an intense look into the design and creation of modern products and technologies. Students develop an understanding of the engineering design process and how it may be used in the development and manufacturing of everyday products. Blueprint reading, sketching for design, Computer Aided Design, Mathematical and Geometric relationships, visual and functional analysis, teamwork and presentation skills, engineering careers, and trends in engineering are just some of the unit topics covered in this course. Additionally, students will be utilizing leading parametric modeling software to create 3-D computer models of mechanical products and to analyze their physical properties.

Revision Date: September 2025

UNIT 1: What Is Engineering	

PA S.T.E.E.L.S:

- 3.5.6-8.II Predict outcomes of a future product or system at the beginning of the design process.
- 3.5.6-8.JJ Apply informed problem-solving strategies to the improvement of existing devices or processes or the development of new approaches.

Competency Task List – Secondary Component- Engineering Technologies/Technicians CIP 15.9999

- **200 Knowledge of Engineering**
  - **201-** Demonstrate knowledge of the history of engineering.
  - **202-** Investigate engineering careers, training, and associated opportunities.
- **300 Ethics in Engineering**
  - **301**-Identify current professional engineering codes of ethics.
  - **302**-Analyze ethical engineering issues.
  - **303**-Analyze and explain ethical and technical issues contributing to an engineering disaster.

UNIT OBJECTIVES (SWBATS):

- Define Engineering
- Identify and describe the types of knowledge used by engineers
- List roles that make an engineering team.
- List several engineering disciplines
- Summarize the historical developments in engineering

INSTRUCTIONAL STRATEGIES/ACTIVITIES:

- Unit presentation
- Unit workbook activity
- Unit Review Activities

ANCHOR VOCABULARY:

ASSESSMENTS (Diagnostic/Benchmark/Formative/Summative):

- Unit 1 packet (Formative)
- Unit 1 Assessment (Summative)

EVIDENCE OF MASTERY/Cut Score (Keystone Exam): N/A

DIFFERENTIATED INSTRUCTION (Remediation/Extension) (Process, Product or Content)

- Peer tutoring
- Grouping with purpose
- Extended time
- Limited response
- Companion website
- Direct instruction

RESOURCES (Websites, Blogs, Videos, Whiteboard Resources, etc.):

- Engineering Fundamentals Textbook- Goodheart-Wilcox(2014)
- Test your knowledge review @ www.g-wlearning.com

RESOURCE SPECIFIC VOCABULARY:	Specifications
Constraints	Trade-off
Engineering design process	
Optimization	

UNIT 2: Engineering Design	

PA S.T.E.E.L.S:

- 3.5.6-8.V Refine design solutions to address criteria and constraints
- 3.5.6-8.W (ETS) Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.

Competency Task List – Secondary Component- Engineering Technologies/Technicians CIP 15.9999

- **700 Engineering Problem Solving and Design Processes**
  - **701-**Apply the steps of an iterative design process.
  - **702**-Create an engineering solution that meets a given design brief.
  - **704-**Generate a design improvement to address specific flaws or failures.

UNIT OBJECTIVES (SWBATS):

- Define *Engineering Design*
- Describe the steps of the engineering design process.
- Explain how to define a problem and its constraints.
- Identify various methods of ideation.
- Summarize the process of creating and testing design solutions
- Explain how to communicate the final design solution
- Describe the purpose of an engineering notebook

INSTRUCTIONAL STRATEGIES/ACTIVITIES:

- Unit presentation
- Unit workbook activity
- Unit Review Activities

ANCHOR VOCABULARY:

ASSESSMENTS (Diagnostic/Benchmark/Formative/Summative):

- Unit 2 packet (Formative)
- Unit 2 Assessment (Summative)

EVIDENCE OF MASTERY/Cut Score (Keystone Exam):

DIFFERENTIATED INSTRUCTION (Remediation/Extension) (Process, Product or Content)

- Peer tutoring
- Grouping with purpose
- Extended time
- Limited response
- Companion website
- Direct instruction

RESOURCES (Websites, Blogs, Videos, Whiteboard Resources, etc.):

- Engineering Fundamentals Textbook- Goodheart-Wilcox(2014)
- Test your knowledge review @ www.g-wlearning.com
- The Launch - Video

RESOURCE SPECIFIC VOCABULARY:	
CAD	Orthographic drawing
CNC	Prototype
Ideation	Rendering
	Multiview drawings

UNIT 3: Defining Problems & Brainstorming	

PA S.T.E.E.L.S:

- 3.5.6-8.V Refine design solutions to address criteria and constraints
- 3.5.6-8.W (ETS) Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.

Competency Task List – Secondary Component- Engineering Technologies/Technicians CIP 15.9999

- **700 Engineering Problem Solving and Design Processes**
  - **701-**Apply the steps of an iterative design process.
  - **702**-Create an engineering solution that meets a given design brief.
  - **704-**Generate a design improvement to address specific flaws or failures.
  - **705-**Create a proposal for an engineering project.

UNIT OBJECTIVES (SWBATS):

- Identify steps used to define problems
- Describe how constraints and criteria are involved in the engineering design process
- Explain the goals of brainstorming
- Identify the importance of problem definition and idea generation to the engineering design process

INSTRUCTIONAL STRATEGIES/ACTIVITIES:

- Unit presentation
- Unit workbook activity
- Unit Review Activities
- DB#1- Step 1

ANCHOR VOCABULARY:

ASSESSMENTS (Diagnostic/Benchmark/Formative/Summative):

- Unit 3 packet (Formative)
- Unit 3 Assessment (Summative)

EVIDENCE OF MASTERY/Cut Score (Keystone Exam):

DIFFERENTIATED INSTRUCTION (Remediation/Extension) (Process, Product or Content)

- Peer tutoring
- Grouping with purpose
- Extended time
- Limited response
- Companion website
- Direct instruction

RESOURCES (Websites, Blogs, Videos, Whiteboard Resources, etc.):

- Engineering Fundamentals Textbook- Goodheart-Wilcox(2014)
- Test your knowledge review @ www.g-wlearning.com
- The Launch - Video

RESOURCE SPECIFIC VOCABULARY:	**Free association**
Brainstorming web Constraints Criteria	Freewriting Future process

UNIT 4: Researching Design	

PA S.T.E.E.L.S:

- 3.5.6-8.Y Compare, contrast, and identify overlap between the contributions of science, technology, engineering, and mathematics in the development of technological systems.
- 3.5.6-8.BB Demonstrate how knowledge gained from other content areas affects the development of technological products and systems.

Competency Task List – Secondary Component- Engineering Technologies/Technicians CIP 15.9999

- **700 Engineering Problem Solving and Design Processes**
  - **701-**Apply the steps of an iterative design process.
  - **704-**Generate a design improvement to address specific flaws or failures.
  - **705-**Create a proposal for an engineering project.
  - **706-**Participate in a design review.

UNIT OBJECTIVES (SWBATS):

- Explain how to communicate potential solution ideas using sketches
- Describe different types of library research
- Identify properties found through experimental research
- Analyze trade-offs in engineering design
- Explain how to select the optimal solution

INSTRUCTIONAL STRATEGIES/ACTIVITIES:

- Unit presentation
- Unit workbook activity
- Unit Review Activities
- DB#1- Step 2
- Sketching Activities
- Sketching Software (Sketchbook Pro) Tutorials and Projects

ANCHOR VOCABULARY:

ASSESSMENTS (Diagnostic/Benchmark/Formative/Summative):

- Unit 4 packet (Formative)
- Unit 4 Assessment (Summative)

EVIDENCE OF MASTERY/Cut Score (Keystone Exam):

DIFFERENTIATED INSTRUCTION (Remediation/Extension) (Process, Product or Content)

- Peer tutoring
- Grouping with purpose
- Extended time
- Limited response
- Companion website
- Direct instruction

RESOURCES (Websites, Blogs, Videos, Whiteboard Resources, etc.):

- Engineering Fundamentals Textbook- Goodheart-Wilcox(2014)
- Test your knowledge review @ www.g-wlearning.com
- The Launch - Video

RESOURCE SPECIFIC VOCABULARY:

Feasibility
Thumbnail Sketch
Trade-off

UNIT 5: Communicating Solutions	

PA S.T.E.E.L.S:

- 3.5.9-12PP 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.

Competency Task List – Secondary Component- Engineering Technologies/Technicians CIP 15.9999

- **500 Teamwork**
  - **502-**Apply constructive feedback.
  - **503-**Develop a plan for conflict resolution.
  - **504-**Apply active listening techniques.
  - **505-**Communicate verbally and in writing.

UNIT OBJECTIVES (SWBATS):

- Explain the importance of properly communicating design solutions
- Identify three types of working drawings
- Identify different drawing classifications
- Select and use appropriate symbols
- Identify line types used in drawings
- Describe dimensioning guidelines
- Discuss industry guidelines used in communicating design solutions

INSTRUCTIONAL STRATEGIES/ACTIVITIES:

- Unit presentation
- Unit workbook activity
- Unit Review Activities
- DB#1- Step 3
- Orthographic and Isometric Drawing Packets

ANCHOR VOCABULARY:

ASSESSMENTS (Diagnostic/Benchmark/Formative/Summative):

- Unit 5 packet (Formative)
- Unit 5 Assessment (Summative)

EVIDENCE OF MASTERY/Cut Score (Keystone Exam):

DIFFERENTIATED INSTRUCTION (Remediation/Extension) (Process, Product or Content)

- Peer tutoring
- Grouping with purpose
- Extended time
- Limited response
- Companion website
- Direct instruction

RESOURCES (Websites, Blogs, Videos, Whiteboard Resources, etc.):

- Engineering Fundamentals Textbook- Goodheart-Wilcox(2014)
- Test your knowledge review @ www.g-wlearning.com
- The Launch - Video

RESOURCE SPECIFIC VOCABULARY:	
Assembly drawing	Dimensioning
Oblique drawing	Schematic
Detail drawing	Engineering drawing
Perspective drawing	Leader

UNIT 6: Modeling, Testing, and Final Outputs	

PA S.T.E.E.L.S.:

- 3.5.9-12PP 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.

Competency Task List – Secondary Component- Engineering Technologies/Technicians CIP 15.9999

- **800 Modeling**
  - **801-** Identify the three areas of modeling, e.g., physical, conceptual, and mathematical.
  - **802-** Create a scale model or working prototype.
  - **803-** Evaluate a scale model or a working prototype.

UNIT OBJECTIVES (SWBATS):

- Explain the importance of predictive analysis to the engineering design process
- Describe principles used in mathematical modeling
- Identify the different types of physical modeling
- Discuss how computer modeling is used in different engineering fields
- Explain the testing process
- Describe the different types of final outputs

INSTRUCTIONAL STRATEGIES/ACTIVITIES:

- Unit presentation
- Unit workbook activity
- Unit Review Activities
- DB#1- Step 4
- Parametric Modeling Software (Inventor) Tutorials and Projects

ANCHOR VOCABULARY:

ASSESSMENTS (Diagnostic/Benchmark/Formative/Summative):

- Unit 6 packet (Formative)
- Unit 6 Assessment (Summative)

EVIDENCE OF MASTERY/Cut Score (Keystone Exam):

DIFFERENTIATED INSTRUCTION (Remediation/Extension) (Process, Product or Content)

- Peer tutoring
- Grouping with purpose
- Extended time
- Limited response
- Companion website
- Direct instruction

RESOURCES (Websites, Blogs, Videos, Whiteboard Resources, etc.):

- Engineering Fundamentals Textbook- Goodheart-Wilcox(2014)
- Test your knowledge review @ www.g-wlearning.com
- The Launch - Video

RESOURCE SPECIFIC VOCABULARY: Parametric Modeling

Aesthetics	Assumption
Computational fluid dynamics	Computer modeling
Engineering economics	Environmental impact
Final project report	Geospatial modeling software
Mathematical model	Mock-up
Predictive analysis	Reverse engineering

UNIT 7: Fab Lab Safety	

PA S.T.E.E.L.S.:

- 3.5.6-8.J Use tools, materials, and machines to safely diagnose, adjust, and repair systems.

Competency Task List – Secondary Component- Engineering Technologies/Technicians CIP 15.9999

- **100 Engineering Safety**
  - **101-** Implement a safety plan, including first aid procedures.
  - **102-** Operate lab equipment according to safety guidelines.
  - **103-** Use personal protective equipment.
  - **104-** Comply with OSHA and EPA regulations for a safe work site.
  - **106-** Maintain safe working practices around tools and equipment.
  - **107-** Participate in classroom and laboratory management and clean-up activities.
  - **109-** Execute lockout/tag out procedures.

UNIT OBJECTIVES (SWBATS):

- Implement a safety plan
- Operate lab equipment according to safety guidelines
- Use appropriate personal protective equipment
- Comply with OSHA and EPA regulations for a safe work site
- Identify first aid procedures
- Maintain safe working practices around tools and equipment
- Participate in classroom and laboratory management and clean-up activities
- Demonstrate a professional attitude toward classroom and laboratory activities

INSTRUCTIONAL STRATEGIES/ACTIVITIES:

- Safety presentation
- Equipment safety demonstrations
- Completion of Fab Lab Safety Packet

ANCHOR VOCABULARY:

ASSESSMENTS (Diagnostic/Benchmark/Formative/Summative):

- Fab Lab Safety Packet (Formative)

EVIDENCE OF MASTERY/Cut Score (Keystone Exam):

DIFFERENTIATED INSTRUCTION (Remediation/Extension) (Process, Product or Content)

- Peer tutoring
- Grouping with purpose
- Extended time
- Limited response
- Companion website
- Direct instruction

RESOURCES (Websites, Blogs, Videos, Whiteboard Resources, etc.):

- The Fab Lab Safety Handbook
- PA Industrial Arts/Technology Education Safety Guide

RESOURCE SPECIFIC VOCABULARY:

- **Tool Vocabulary (To many to mention)**

UNIT 9: Manufacturing Engineering	

Competency Task List – Secondary Component- Engineering Technologies/Technicians CIP 15.9999

700 Engineering Problem Solving and Design Processes

- 701-Apply the steps of an iterative design process.
- 702-Create an engineering solution that meets a given design brief.
- 707-Prepare a schedule and/or a material list for a design project.

1000 Manufacturing Processes

- 1008-Make a list of the production processes in manufacturing.
- 1009-Apply manufacturing systems to develop and produce a product.

UNIT OBJECTIVES (SWBATS):

- Define manufacturing engineering.
- Explain how raw materials are harvested.
- Describe the manufacturing processes.
- Discuss applications of production management.
- List and describe the main areas of production control.
- Complete a manufacturing project using the equipment in the lab

INSTRUCTIONAL STRATEGIES/ACTIVITIES:

- Unit presentation
- Bioengineering Design Brief

ANCHOR VOCABULARY:

ASSESSMENTS (Diagnostic/Benchmark/Formative/Summative):

- Unit packet (Formative)
- Unit Assessment (Summative)
- Manufacturing Project (Summative)

EVIDENCE OF MASTERY/Cut Score (Keystone Exam):

DIFFERENTIATED INSTRUCTION (Remediation/Extension) (Process, Product or Content)

- Peer tutoring
- Grouping with purpose
- Extended time
- Limited response
- Companion website
- Direct instruction

RESOURCES (Websites, Blogs, Videos, Whiteboard Resources, etc.):

- Engineering Fundamentals Textbook- Goodheart-Wilcox(2014)
- Test your knowledge review @ www.g-wlearning.com

RESOURCE SPECIFIC VOCABULARY:

Alloy Casting Fixture Jig Polymer
Preliminary Processing Secondary Processing Thermoplastic Thermoset Plastic

UNIT 10: Bioengineering Project	

PA S.T.E.E.L.S.:

- 3.5.9-12.X Implement the best possible solution to a design using an explicit process.
- 3.5.9-12.Y (ETS) Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.

Competency Task List – Secondary Component- Engineering Technologies/Technicians CIP 15.9999

700 Engineering Problem Solving and Design Processes

- 701-Apply the steps of an iterative design process.
- 702-Create an engineering solution that meets a given design brief.
- 707-Prepare a schedule and/or a material list for a design project.
- 708-Write an engineering problem statement.

800 Modeling

- 801-Identify the three areas of modeling (e.g., physical, conceptual, and mathematical).
- 802-Create a scale model, working prototype, or simulation.
- 803-Evaluate a scale model, a working prototype, or simulation.

UNIT OBJECTIVES (SWBATS):

- Define Bioengineering
- Identify the 5 fields of study on which all bioengineering is based
- Discuss the different forms of bioconversion used in biological engineering
- Describe the role of bioengineering in agricultural production
- Describe the impact of biomedical engineering in our society
- Complete a bioengineering design brief by progressing through the engineering design process and construct a working prototype.

INSTRUCTIONAL STRATEGIES/ACTIVITIES:

- Unit presentation
- Bioengineering Design Brief

ANCHOR VOCABULARY:

ASSESSMENTS (Diagnostic/Benchmark/Formative/Summative):

- Unit 8 packet (Formative)
- Engineering Design Brief Group Rubric (Summative)
- Engineering Design Brief Individual Rubric (Summative)

EVIDENCE OF MASTERY/Cut Score (Keystone Exam):

DIFFERENTIATED INSTRUCTION (Remediation/Extension) (Process, Product or Content)

- Peer tutoring
- Grouping with purpose
- Extended time
- Limited response
- Companion website
- Direct instruction

RESOURCES (Websites, Blogs, Videos, Whiteboard Resources, etc.):

- Engineering Fundamentals Textbook- Goodheart-Wilcox(2014)
- Test your knowledge review @ www.g-wlearning.com

RESOURCE SPECIFIC VOCABULARY:

Biomass	Anaerobic	Biomass	Compost
Crop Yield	Fermentation	Herbicides	Monoclonal Antibodies

UNIT 11: Aerospace Engineering Project	

PA S.T.E.E.L.S.:

- 3.5.9-12.X Implement the best possible solution to a design using an explicit process.
- 3.5.9-12.Y (ETS) Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.

Competency Task List – Secondary Component- Engineering Technologies/Technicians CIP 15.9999

700 Engineering Problem Solving and Design Processes

- 701-Apply the steps of an iterative design process.
- 702-Create an engineering solution that meets a given design brief.
- 707-Prepare a schedule and/or a material list for a design project.
- 708-Write an engineering problem statement.

800 Modeling

- 801-Identify the three areas of modeling (e.g., physical, conceptual, and mathematical).
- 802-Create a scale model, working prototype, or simulation.
  803-Evaluate a scale model, a working prototype, or simulation.

UNIT OBJECTIVES (SWBATS):

- Define aerospace engineering.
- Explain Newton's laws of motion.
- Explain the roles of fluid mechanics and aerodynamics in aerospace engineering.
- Understand the laws of conservation.
- Describe the forces acting on an aircraft in flight.
- Give examples of aerospace engineering applications.
- Complete an aerospace design brief by progressing through the engineering design process and construct a working prototype.

INSTRUCTIONAL STRATEGIES/ACTIVITIES:

- Unit presentation
- Engineering Design Brief Project 2

ANCHOR VOCABULARY:

ASSESSMENTS (Diagnostic/Benchmark/Formative/Summative):

- Engineering Design Brief Group Rubric (Summative) if applicable
- Engineering Design Brief Individual Rubric (Summative)

EVIDENCE OF MASTERY/Cut Score (Keystone Exam):

DIFFERENTIATED INSTRUCTION (Remediation/Extension) (Process, Product or Content)

- Peer tutoring
- Grouping with purpose
- Extended time
- Limited response
- Companion website
- Direct instruction

RESOURCES (Websites, Blogs, Videos, Whiteboard Resources, etc.):

- Engineering Fundamentals Textbook- Goodheart-Wilcox(2014)
- Test your knowledge review @ www.g-wlearning.com

RESOURCE SPECIFIC VOCABULARY:

aerodynamics	aileron	angle of attack	dihedral angle
drag	lift	pitch	propeller
rudder	thrust	yaw	

UNIT 12: Engineering Project #3 STUDENT CHOICE	

PA COMMON CORE/NATIONAL STANDARDS:

- **3.3.4.12.C2:** Apply the concept that engineering design is influenced by personal characteristics, such as creativity, resourcefulness, and the ability to visualize and think abstractly.
- **3.4.12.C3:** Apply the concept that many technological problems require a multi-disciplinary approach.

UNIT OBJECTIVES (SWBATS):

- Students will choose an engineering discipline to discover
- Define that engineering discipline
- Explain the level of education and requirements for employment
- Explain and describe basic concepts of the engineering discipline

INSTRUCTIONAL STRATEGIES/ACTIVITIES:

- Unit presentation
- Engineering Design Brief Project 3

ANCHOR VOCABULARY:

ASSESSMENTS (Diagnostic/Benchmark/Formative/Summative):

- Unit packet (Formative)
- Engineering Design Brief Group Rubric (Summative) if applicable
- Engineering Design Brief Individual Rubric (Summative)

EVIDENCE OF MASTERY/Cut Score (Keystone Exam):

DIFFERENTIATED INSTRUCTION (Remediation/Extension) (Process, Product or Content)

- Peer tutoring
- Grouping with purpose
- Extended time
- Limited response
- Companion website
- Direct instruction

RESOURCES (Websites, Blogs, Videos, Whiteboard Resources, etc.):

- Engineering Fundamentals Textbook- Goodheart-Wilcox(2014)
- Test your knowledge review @ www.g-wlearning.com

RESOURCE SPECIFIC VOCABULARY:

- **TBD**

CAD UNIT 1: Fundamentals of AutoCAD	

PA S.T.E.E.L.S:

- **3.5.9-12.A** Use various approaches to communicate processes and procedures for using, maintaining, and assessing technological products and systems.
- **3..5.9-12.K (ETS)** Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem.
- **3.5.9-12PP** 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

Competency Task List – Secondary Component- Engineering Technologies/Technicians CIP 15.9999

- **600 Engineering Graphics**
  - **601**-Use graphics equipment and tools.
  - **602**-Read and interpret various types of drawings.
  - **603**-Perform metric to U.S. system conversions.

UNIT OBJECTIVES (SWBATS):

- Create and Save AutoCAD drawing files
- Use the AutoCAD visual reference commands
- Draw, using the LINE and CIRCLE commands
- Use the ERASE command
- Define Positions using the Basic Entry methods
- Use the AutoCAD Pan Realtime option

INSTRUCTIONAL STRATEGIES/ACTIVITIES:

- Unit presentation
- Unit Tutorial Exercise
- Topic demonstration
- Unit CAD Exercises

ANCHOR VOCABULARY:

ASSESSMENTS (Diagnostic/Benchmark/Formative/Summative):

- Unit CAD Exercises (Formative)
- Unit review questions (Summative) if applicable

EVIDENCE OF MASTERY/Cut Score (Keystone Exam):

DIFFERENTIATED INSTRUCTION (Remediation/Extension) (Process, Product or Content)

- Peer tutoring
- Grouping with purpose
- Extended time
- Limited response
- Companion website
- Direct instruction

RESOURCES (Websites, Blogs, Videos, Whiteboard Resources, etc.):

- www.Autodesk.com
- AutoCAD Quick Start Resources- AutoCAD Quick Start Guide | Autodesk https://www.autodesk.com/learn/ondemand/curated/autocad-quick-start-guide

RESOURCE SPECIFIC VOCABULARY:

- **N/A**

CAD UNIT 2: Basic Object Construction and Dynamic Input	

PA S.T.E.E.L.S:

- **3..5.9-12.K (ETS)** Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem.
- **3.5.9-12PP** 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

Competency Task List – Secondary Component- Engineering Technologies/Technicians CIP 15.9999

- **600 Engineering Graphics**
  - **606** Apply line conventions.
  - **607** Prepare orthographic projection drawings.
  - **608** Prepare additional views to clarify the design.
  - **610** Prepare drawings for product assembly, fabrication, or construction.

UNIT OBJECTIVES (SWBATS):

- Reference the WCS.
- Use the Startup dialog box.
- Set up GRID & SNAP intervals.
- Display AutoCAD's toolbars.
- Set up and use OBJECT SNAPS.
- Edit, using the TRIM command.
- Use the Polygon command.
- Create TTR circles.
- Create Tangent lines.

INSTRUCTIONAL STRATEGIES/ACTIVITIES:

- Unit presentation
- Unit Tutorial Exercise
- Topic demonstration
- Unit CAD Exercises

ANCHOR VOCABULARY:

ASSESSMENTS (Diagnostic/Benchmark/Formative/Summative):

- Unit CAD Exercises (Formative)
- Unit review questions (Summative) if applicable

EVIDENCE OF MASTERY/Cut Score (Keystone Exam):

DIFFERENTIATED INSTRUCTION (Remediation/Extension) (Process, Product or Content)

- Peer tutoring
- Grouping with purpose
- Extended time
- Limited response
- Companion website
- Direct instruction

RESOURCES (Websites, Blogs, Videos, Whiteboard Resources, etc.):

- www.Autodesk.com
- AutoCAD Quick Start Resources- AutoCAD Quick Start Guide | Autodesk https://www.autodesk.com/learn/ondemand/curated/autocad-quick-start-guide

RESOURCE SPECIFIC VOCABULARY:

- **N/A**

CAD UNIT 3: Geometric Construction and Editing Tools	

PA S.T.E.E.L.S:

- **3.5.9-12.A** Use various approaches to communicate processes and procedures for using, maintaining, and assessing technological products and systems.
- **3..5.9-12.K (ETS)** Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem.
- **3.5.9-12PP** 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

Competency Task List – Secondary Component- Engineering Technologies/Technicians CIP 15.9999

- **600 Engineering Graphics**
  - **606** Apply line conventions.
  - **607** Prepare orthographic projection drawings.
  - **608** Prepare additional views to clarify the design.
  - **610** Prepare drawings for product assembly, fabrication, or construction.
  - **612** Revise an existing drawing to meet modifications or changes.

UNIT OBJECTIVES (SWBATS):

- Set up the display of Drawing Units.
- Set up and use OBJECT SNAPS.
- Edit, using EXTEND and TRIM.
- Use the FILLET command.
- Create parallel geometric entities.
- Using the PEDIT command.
- Use the EXPLODE command.

INSTRUCTIONAL STRATEGIES/ACTIVITIES:

- Unit presentation
- Unit Tutorial Exercise
- Topic demonstration
- Unit CAD Exercises

ANCHOR VOCABULARY:

ASSESSMENTS (Diagnostic/Benchmark/Formative/Summative):

- Unit CAD Exercises (Formative)
- Unit review questions (Summative) if applicable

EVIDENCE OF MASTERY/Cut Score (Keystone Exam):

DIFFERENTIATED INSTRUCTION (Remediation/Extension) (Process, Product or Content)

- Peer tutoring
- Grouping with purpose
- Extended time
- Limited response
- Companion website
- Direct instruction

RESOURCES (Websites, Blogs, Videos, Whiteboard Resources, etc.):

- www.Autodesk.com
- AutoCAD Quick Start Resources- AutoCAD Quick Start Guide | Autodesk https://www.autodesk.com/learn/ondemand/curated/autocad-quick-start-guide

RESOURCE SPECIFIC VOCABULARY:

- **N/A**

CAD UNIT 4: Orthographic Views in Multiview Drawings	

PA S.T.E.E.L.S:

- **3.5.9-12.A** Use various approaches to communicate processes and procedures for using, maintaining, and assessing technological products and systems.
- **3..5.9-12.K (ETS)** Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem.
- **3.5.9-12PP** 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

Competency Task List – Secondary Component- Engineering Technologies/Technicians CIP 15.9999

- **600 Engineering Graphics**
  - **601**-Use graphics equipment and tools.
  - **606**-Apply line conventions.
  - **607-**Prepare orthographic projection drawings.
  - **608-**Prepare additional views to clarify the design.

UNIT OBJECTIVES (SWBATS):

- Create 2D orthographic views using AutoCAD.
- Using the CONSTRUCTION LINE command to draw.
- Using Running Object Snaps.
- Use AutoCAD's AutoSnap and AutoTrack features.
- Create a Miter line to transfer dimensions.
- Using Projection lines between orthographic views.
- Use the POLAR Tracking option.

INSTRUCTIONAL STRATEGIES/ACTIVITIES:

- Unit presentation
- Unit Tutorial Exercise
- Topic demonstration
- Unit CAD Exercises

ANCHOR VOCABULARY:

ASSESSMENTS (Diagnostic/Benchmark/Formative/Summative):

- Unit CAD Exercises (Formative)
- Unit review questions (Summative) if applicable

EVIDENCE OF MASTERY/Cut Score (Keystone Exam):

DIFFERENTIATED INSTRUCTION (Remediation/Extension) (Process, Product or Content)

- Peer tutoring
- Grouping with purpose
- Extended time
- Limited response
- Companion website
- Direct instruction

RESOURCES (Websites, Blogs, Videos, Whiteboard Resources, etc.):

- www.Autodesk.com
- AutoCAD Quick Start Resources- AutoCAD Quick Start Guide | Autodesk https://www.autodesk.com/learn/ondemand/curated/autocad-quick-start-guide

RESOURCE SPECIFIC VOCABULARY:

- **N/A**

CAD UNIT 5: Basic Dimensioning and Notes	

PA S.T.E.E.L.S:

- **3..5.9-12.K (ETS)** Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem.
- **3.5.9-12PP** 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

Competency Task List – Secondary Component- Engineering Technologies/Technicians CIP 15.9999

- **600 Engineering Graphics**
  - **601**-Use graphics equipment and tools.
  - **602**-Read and interpret various types of drawings.
  - **603**-Perform metric to U.S. system conversions.
  - **604**-Interpret scale on a drawing.
  - **606**-Apply line conventions.
  - **609**-Apply principles of dimensioning and annotation.

UNIT OBJECTIVES (SWBATS):

- Demonstrate dimensioning nomenclature and basics.
- Display and use the Dimension toolbar.
- Use the AutoCAD Dimension Style Manager.
- Create Center Marks.
- Add Linear and Angular Dimensions.
- Use the SINGLE LINE TEXT command.
- Create SPECIAL CHARACTERS in Notes.
- Using the AutoCAD Classic Workspace.

INSTRUCTIONAL STRATEGIES/ACTIVITIES:

- Unit presentation
- Unit Tutorial Exercise
- Topic demonstration
- Unit CAD Exercises

ANCHOR VOCABULARY:

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EVIDENCE OF MASTERY/Cut Score (Keystone Exam):

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RESOURCE SPECIFIC VOCABULARY:

- **N/A**