Wallenpaupack Area School District Curriculum	
COURSE: Engineering Technology II	**GRADE/S: 11**

Wallenpaupack Area School District
Planned Course Curriculum Guide

Career and Technical Education

Engineering Technologies II

Course Description:
Engineering Technologies II is a concentrated examination into Energy, Power, Electronics and Automation with an underlying focus on careers and industry certifications. Through hands-on activities, students will be exposed to where our energy comes from and how engineers use it to power systems in our technologically driven society. Students will explore the topics of basic electricity and demonstrate their knowledge through the construction of electrical circuits. Ultimately, students will tie all this together by building, programming and simulating robotic systems and programable logic controllers.

Revision Date: September 2025

E.P.T. UNIT 1- Introduction to Energy

PA STANDARDS:

- 3.1.10.A: Relate how the position and motion of an object are affected by forces.
- 3.2.10.A: Understand and apply concepts of energy, including mechanical energy, and the conversion of energy from one form to another.

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

- 1201-Differentiate between power, work, and energy.
- 1205 -Calculate the efficiency of energy conversions, e.g., electrical, fluid, mechanical.
- 1306-Convert power between units.

UNIT OBJECTIVES (SWBATS):

- Identify types of energy surrounding us.
- Differentiate between renewable, nonrenewable, and inexhaustible energy sources.
- Explain the difference between potential and kinetic energy.
- Name and describe the six forms of energy.
- Recognize various factors that influence the exploration and development of different energy resources.
- Give examples of reasons for growth in the demand for energy and power.

INSTRUCTIONAL STRATEGIES/ACTIVITIES:

- Unit presentation
- Unit workbook activity
- Unit Review Activities
- STEM Activities, Text, p. 38
- Activity 1.1: Using the Technological Systems Model to Study Technology, Tech Lab Workbook, pp. 11–14

ANCHOR VOCABULARY:

ASSESSMENTS (Diagnostic/Benchmark/Formative/Summative):

- Unit Packet (Formative)
- Unit Assessment (Summative)
  - Test Your Knowledge, Text, pp. 37–38
  - Study Guide, Tech Lab Workbook, pp. 9–10
  - Chapter 1 Quiz

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.):

- Energy, Power and Transportation Technology- Textbook- Goodheart-Wilcox(2014)
- Test your knowledge review @ www.g-wlearning.com
- U.S. Department of Energy (DOE) www.energy.gov

RESOURCE SPECIFIC VOCABULARY:

BTU EFFICIENCY ENTROPY INEXHAUSTIBLE OPEC QUAD

E.P.T. UNIT 2- Energy Sources

PA STANDARDS:

- 3.2.10.A: Understand and apply concepts of energy, including mechanical energy, and the conversion of energy from one form to another.
- 3.4.10.A: Analyze how technology is used to solve problems and improve life.
- 2.1.10.C: Use measurements to solve problems and make decisions
- 4.3.10.B: Understand the importance of sustainable practices in engineering and design.

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

- 1501 Produce mechanical power using alternative energy systems.
- 1502 Research renewable and non-renewable energy sources.
- 1503 Investigate energy efficiency and conservation.
- 1504 Create a model that will utilize a renewable energy concept.

UNIT OBJECTIVES (SWBATS):

- Name three nonrenewable sources of energy.
- List the characteristics of the different types of coal.
- Describe the process of how electrical power is generated using nuclear fission as an energy source.
- Describe the history of the nuclear power industry in the United States.
- Describe at least three different methods of producing power from renewable energy resources.
- Describe at least six examples of different methods of producing power from inexhaustible energy
- Explain the difference between open loop solar collection and closed loop solar collection.
- Describe three basic types of active solar collectors.

INSTRUCTIONAL STRATEGIES/ACTIVITIES:

- Unit presentation
- Unit workbook activity
- Unit Review Activities
  - STEM Activities, Text, p. 141
  - Activity 6.1: Constructing an Active Solar Collector, Tech Lab Workbook, pp. 43–44
  - Activity 6.2: Designing a Passive Solar Home, Tech Lab Workbook, p. 45

ANCHOR VOCABULARY:

ASSESSMENTS (Diagnostic/Benchmark/Formative/Summative):

- Unit Packet (Formative)
- Unit Assessment (Summative)
  - Test Your Knowledge, Text, pp. 140–141
  - Study Guide, Tech Lab Workbook, pp. 41–42
  - Chapter 6 Quiz

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.):

- Energy, Power and Transportation Technology- Textbook- Goodheart-Wilcox(2014)

RESOURCE SPECIFIC VOCABULARY:

ELECTROSTATIC PRECIPITATOR KEROGEN OVERBURDEN ISOTOPE
KYOTO PROTOCOL FISSION FUSION PLASMA
BIOMASS HEAT PUMP PENSTOCK

E.P.T. UNIT 3- Introduction to Power

PA STANDARDS:

- 3.2.10.A: Understand and apply concepts of energy, including mechanical energy, and the conversion of energy from one form to another.
- 3.4.10.B: Explore and demonstrate the use of tools, machines, and materials to construct a product.
- 2.1.10.C: Use measurements to solve problems and make decisions
- 4.3.10.B: Understand the importance of sustainable practices in engineering and design.

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

- 1201-Differentiate between power, work, and energy.
- 1302-Measure forces and distances related to mechanisms.
- 1306-Convert power between units.

UNIT OBJECTIVES (SWBATS):

- Identify the difference between work and power.
- Define power.
- Identify the basic power systems.
- Describe various forms of power for specific applications.
- Diagram the basic power components in an electrical circuit or a fluid circuit.
- Calculate the efficiency of power systems and conversion devices.
- Compute power and hp for various forms of power.

INSTRUCTIONAL STRATEGIES/ACTIVITIES:

- Unit presentation
- Unit workbook activity
- Unit Review Activities
    - STEM Activities, Text, p. 159
    - Activity 7.1: Experimenting with a Hydroelectric Generator, Tech Lab Workbook, pp. 50–52
    - Activity 7.2: Improving Your Hydroelectric Generator, Tech Lab Workbook, pp. 53–54

ANCHOR VOCABULARY:

ASSESSMENTS (Diagnostic/Benchmark/Formative/Summative):

- Unit Packet (Formative)
- Unit Assessment (Summative)
    - Test Your Knowledge, Text, pp. 157–159
    - Study Guide, Tech Lab Workbook, pp. 47–49
    - Chapter 7 Quiz

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.):

- Energy, Power and Transportation Technology- Textbook- Goodheart-Wilcox(2014)

RESOURCE SPECIFIC VOCABULARY:

AMPERAGE COULOMB LOAD PNEUMATIC TORQUE

E.P.T. UNIT4- Mechanical Power Systems

PA STANDARDS:

- 3.2.10.A: Understand and apply concepts of energy, including mechanical energy, and the conversion of energy from one form to another.
- 3.4.10.B: Explore and demonstrate the use of tools, machines, and materials

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

- 1201-Differentiate between power, work, and energy.
- 1302-Measure forces and distances related to mechanisms.
- 1303-Calculate mechanical advantage and drive ratios of mechanisms.
- 1305-Determine efficiency in a mechanical system.
- 1306-Convert power between units.
- 1307-Measure torque and use it to calculate power.

UNIT OBJECTIVES (SWBATS):

- List the six simple machines and give an example of each.
- List three types of gears.
- Name the two primary characteristics of power.
- Design a mechanical system for a specific application.
- Predict the result of a mechanical system based on knowledge of balanced and unbalanced loads.
- Calculate the mechanical advantage of a simple machine.

INSTRUCTIONAL STRATEGIES/ACTIVITIES:

- Unit presentation
- Unit workbook activity
- Unit Review Activities
- Design a mechanical system for a specific application.
- Predict the result of a mechanical system based on knowledge of balanced and unbalanced loads.
- Calculate the mechanical advantage of a simple machine.

ANCHOR VOCABULARY:

ASSESSMENTS (Diagnostic/Benchmark/Formative/Summative):

- Unit Packet (Formative)
- Unit Assessment (Summative)
  - Test Your Knowledge, Text, pp. 225–226
  - Study Guide, Tech Lab Workbook, pp. 67–68
  - Chapter 9 Quiz

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.):

- Energy, Power and Transportation Technology- Textbook- Goodheart-Wilcox(2014)
- Brock Institute for Advanced Studies www.brockeng.com/mechanism

RESOURCE SPECIFIC VOCABULARY:

ACTUAL MECHANICAL ADVANTAGE BRAKE HORSE POWER FULCRUM IDEAL MECHANICAL ADVANTAGE PRONY BRAKE SCALAR QUANTITY VELOCITY

E.P.T. UNIT 5- Fluid Power Systems

PA STANDARDS:

- 3.2.10.A: Understand and apply concepts of energy, including mechanical energy, and the conversion of energy from one form to another.
- 3.4.10.B: Explore and demonstrate the use of tools, machines, and materials
- 3.2.12.A1: Compare and contrast colligative properties of mixtures.

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

- 1401 Design, create, and test a fluid power system.
- 1402 Identify components of a fluid system.
- 1403 Calculate values in a fluid power system using Pascal's law.
- 1404 Calculate values in a pneumatic system using the ideal gas laws.
- 1405 Calculate mechanical advantage in a fluid power system.

UNIT OBJECTIVES (SWBATS):

- Recognize the differences between hydraulic and pneumatic power systems.
- Identify the advantages of using fluid power systems.
- List the uses of valves in fluid power systems.
- Calculate the mechanical advantage created by using liquids under pressure.
- Compute the size of cylinders necessary to perform a specific application.
- Design simple fluid power circuits that are controlled by electricity.

INSTRUCTIONAL STRATEGIES/ACTIVITIES:

- Unit presentation
- Unit workbook activity
- Unit Review Activities
    - STEM Activities, Text, p. 254
    - Activity 10.1: Basic Fluid Power Components and Circuitry, Tech Lab Workbook, pp. 79–80
    - Activity 10.2: Controlling Fluid Power Circuits, Tech Lab Workbook, pp. 81–82
    - Activity 10.3: Designing Fluid Power Systems, Tech Lab Workbook, pp. 83–86

ANCHOR VOCABULARY:

ASSESSMENTS (Diagnostic/Benchmark/Formative/Summative):

- Unit Packet (Formative)
- Unit Assessment (Summative)
    - Test Your Knowledge, Text, pp. 252–253
    - Study Guide, Tech Lab Workbook, pp. 77–78
    - Chapter 10 Quiz

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.):

- Energy, Power and Transportation Technology- Textbook- Goodheart-Wilcox(2014)
- Power Technology www.power-technology.com

RESOURCE SPECIFIC VOCABULARY:

ACTUATOR CENTRIFUGAL IMPELLER LAMINAR FLOW PASCAL'S LAW RESERVOIR TURBULENCE VISCOSITY

E&BE UNIT 1- Fundamentals of Electricity

PA STANDARDS:

- 3.2.10.B: Identify and demonstrate safe practices in the use of technology.
- 3.2.10.C: Use appropriate tools and techniques to measure, test, and analyze data.
- 3.1.10.A: Explain how electricity is generated and transmitted.
- 3.1.10.B: Demonstrate the relationship between electric current, voltage, and resistance.

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

- 2302 Define and describe basic terms in electricity and electronics.
- 2303 Identify electrical and electronic symbols on a schematic.
- 2304 Follow a schematic and construct series and parallel electrical and electronic circuits.

UNIT OBJECTIVES (SWBATS):

- Name the three things required in any completed circuit.
- Explain what is meant by open and closed circuit.
- Explain what is happening inside a wire when electricity is flowing.
- List reasons for using an electrical schematic.
- Draw the symbols for a lamp, battery, wire, and speaker.
- Describe the direction and speed of electron flow in a completed circuit.

INSTRUCTIONAL STRATEGIES/ACTIVITIES:

- Unit presentation
- Unit workbook activity
- Unit Review Activities
- Hands on Electronics Construction Activity

ANCHOR VOCABULARY:

ASSESSMENTS (Diagnostic/Benchmark/Formative/Summative):

- Unit Packet (Formative)
- Unit Assessment (Summative)
  - Test Your Knowledge, Text, page 24
  - Chapter 1 Quiz

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.):

- Electricity and Basic Electronics- Textbook- Goodheart-Wilcox(2014)
- Test your knowledge review @ www.g-wlearning.com

RESOURCE SPECIFIC VOCABULARY:

BATTERY CELL CLOSED CIRCUIT ELECTRON LOAD OPEN CIRCUIT SCHEMATIC

E&BE UNIT 2- Sources of Electricity

PA STANDARDS:

- 3.2.10.B: Identify and demonstrate safe practices in the use of technology.
- 3.2.10.C: Use appropriate tools and techniques to measure, test, and analyze data.
- 3.1.10.A: Explain how electricity is generated and transmitted.
- 3.1.10.B: Demonstrate the relationship between electric current, voltage, and resistance.

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

- 2302 Define and describe basic terms in electricity and electronics.
- 2303 Identify electrical and electronic symbols on a schematic.
- 2304 Follow a schematic and construct series and parallel electrical and electronic circuits.
- 2306 Use various types of sensing and control devices.

UNIT OBJECTIVES (SWBATS):

- Identify five ways to produce electricity.
- Give examples of devices that produce electricity.
- Describe various devices that produce electricity.

INSTRUCTIONAL STRATEGIES/ACTIVITIES:

- Unit presentation
- Unit workbook activity
- Unit Review Activities
- Hands on Electronics Construction Activity

ANCHOR VOCABULARY:

ASSESSMENTS (Diagnostic/Benchmark/Formative/Summative):

- Unit Packet (Formative)
- Unit Assessment (Summative)
  - Test Your Knowledge, Text, page 37
  - Chapter 2 Quiz

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.):

- Electricity and Basic Electronics- Textbook- Goodheart-Wilcox(2014)
- Test your knowledge review @ www.g-wlearning.com

RESOURCE SPECIFIC VOCABULARY:

DEAD CELL DIRECT CURRENT DRY CELL PIEZOELECTRICITY PRIMARY CELL SECONDARY CELL SPECIFIC GRAVITY THERMOCOUPLE

E&BE UNIT 3- Conductors and Insulators

PA STANDARDS:

- 3.2.10.B: Identify and demonstrate safe practices in the use of technology.
- 3.2.10.C: Use appropriate tools and techniques to measure, test, and analyze data.
- 3.1.10.A: Explain how electricity is generated and transmitted.
- 3.1.10.B: Demonstrate the relationship between electric current, voltage, and resistance.

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

- 2302 Define and describe basic terms in electricity and electronics.
- 2303 Identify electrical and electronic symbols on a schematic.
- 2304 Follow a schematic and construct series and parallel electrical and electronic circuits.
- 2306 Use various types of sensing and control devices.

UNIT OBJECTIVES (SWBATS):

- Identify items that are conductors and insulators.
- Describe the process of stripping the insulation from wire.
- Explain how wire size is measured.
- Draw the symbol for a fuse.
- Explain why fuses are used to protect circuits.
- Demonstrate the process of soldering wire and the use of a heat sink.

INSTRUCTIONAL STRATEGIES/ACTIVITIES:

- Unit presentation
- Unit workbook activity
- Unit Review Activities
- Hands on Electronics Construction Activity

ANCHOR VOCABULARY:

ASSESSMENTS (Diagnostic/Benchmark/Formative/Summative):

- Unit Packet (Formative)
- Unit Assessment (Summative)
  - Test Your Knowledge, Text, page 58
  - Math Focus 3-1, Text, page 45
  - Math Focus 3-2, Text, pages 46–47
  - Chapter 3 Quiz

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.):

- Electricity and Basic Electronics- Textbook- Goodheart-Wilcox(2014)

RESOURCE SPECIFIC VOCABULARY:

AWG CIRCULAR MILS FLUX FUSE HEAT SINK
INSULATOR SHORT CIRCUIT SOLDER WIRE HARNESS

E&BE UNIT 4- Resistors and Capacitors

PA STANDARDS:

- 3.2.10.B: Identify and demonstrate safe practices in the use of technology.
- 3.2.10.C: Use appropriate tools and techniques to measure, test, and analyze data.
- 3.1.10.A: Explain how electricity is generated and transmitted.
- 3.1.10.B: Demonstrate the relationship between electric current, voltage, and resistance.

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

- 2302 Define and describe basic terms in electricity and electronics.
- 2303 Identify electrical and electronic symbols on a schematic.
- 2304 Follow a schematic and construct series and parallel electrical and electronic circuits.
- 2305 Identify resistors by type and value.
- 2307 Use a digital multimeter to measure circuit values of current, resistance, and voltage.

UNIT OBJECTIVES (SWBATS):

- Explain how a resistor works and what it does.
- Draw the symbols for resistors and capacitors.
- Describe some of the uses for thermistors.
- Compute the value of a resistor by its color code.
- Contrast the different types of capacitors.
- Explain the difference between a farad, microfarad, and picofarad.
- Demonstrate the proper way to handle and discharge capacitors.

INSTRUCTIONAL STRATEGIES/ACTIVITIES:

- Unit presentation
- Unit workbook activity
- Unit Review Activities
- Hands on Electronics Construction Activity

ANCHOR VOCABULARY:

ASSESSMENTS (Diagnostic/Benchmark/Formative/Summative):

- Unit Packet (Formative)
- Unit Assessment (Summative)
  - Test Your Knowledge, Text, page 84
  - Math Focus 4-1, Text, pages70–71
  - Math Focus 4-2, Text, pages 78–79

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.):

- Electricity and Basic Electronics- Textbook- Goodheart-Wilcox(2014)

RESOURCE SPECIFIC VOCABULARY:

CAPACITANCE COULOMB ELECTROLYTE FARAD OHM
POLARIZED RESISTOR RHEOSTAT

E&BE UNIT 5- Ohm's Law

PA STANDARDS:

- 3.2.10.B: Identify and demonstrate safe practices in the use of technology.
- 3.2.10.C: Use appropriate tools and techniques to measure, test, and analyze data.
- 3.1.10.A: Explain how electricity is generated and transmitted.
- 3.1.10.B: Demonstrate the relationship between electric current, voltage, and resistance.

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

- 2302 Define and describe basic terms in electricity and electronics.
- 2303 Identify electrical and electronic symbols on a schematic.
- 2307 Use a digital multimeter to measure circuit values of current, resistance, and voltage.
- 2308 Compute values of current, resistance, and voltage using Ohm's law.
- 2311 Calculate voltage, amperage, resistance, and power in all types of circuits.
- 2312 Troubleshoot all types of circuits.

UNIT OBJECTIVES (SWBATS):

- Calculate the value of voltage, current, and resistance using Ohm's law.
- Apply the power formula to determine wattage.
- Read a kilowatt-hour meter.
- Determine the amount and cost of the electricity used in your home.
- Measure your body resistance with an ohmmeter.

INSTRUCTIONAL STRATEGIES/ACTIVITIES:

- Unit presentation
- Unit workbook activity
- Unit Review Activities
- Hands on Electronics Construction Activity

ANCHOR VOCABULARY:

ASSESSMENTS (Diagnostic/Benchmark/Formative/Summative):

- Unit Packet (Formative)
- Unit Assessment (Summative)
  - Test Your Knowledge, Text, page 100
  - Math Focus 5-1, Text, pages 94–95
  - Chapter 5 Quiz

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.):

- Electricity and Basic Electronics- Textbook- Goodheart-Wilcox(2014)

RESOURCE SPECIFIC VOCABULARY:

ELECTROMOTIVE FORCE POWER VOLTAGE WATT

E&BE UNIT 6- Series, Parallel & Series-Parallel Circuits

PA STANDARDS:

- 3.2.10.B: Identify and demonstrate safe practices in the use of technology.
- 3.2.10.C: Use appropriate tools and techniques to measure, test, and analyze data.
- 3.1.10.B: Demonstrate the relationship between electric current, voltage, and resistance.

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

- 2302 Define and describe basic terms in electricity and electronics.
- 2303 Identify electrical and electronic symbols on a schematic.
- 2304 Follow a schematic and construct series and parallel electrical and electronic circuits.
- 2308 Compute values of current, resistance, and voltage using Ohm's law.
- 2311 Calculate voltage, amperage, resistance, and power in all types of circuits.
- 2312 Troubleshoot all types of circuits.
- 2313 Identify functions, operation, and characteristics of grounding systems.
- 2322 Describe and identify an amplifier.
- 2323 Construct a power supply circuit and verify operation.

UNIT OBJECTIVES (SWBATS):

- Construct a series circuit using various components.
- Calculate the total resistance, voltage, and current in a circuit.
- Calculate the total capacitance in a series circuit.
- Determine the polarity of batteries and install them with correct polarity in a device.
- Use a continuity light to find the two ends of a wire in a cable.
- Construct a parallel circuit using various components.
- Calculate the total resistance, voltage, and current in a parallel circuit.
- Calculate the total capacitance in a parallel circuit.
- State a simple rule for calculating the total resistance of equal resistors in parallel.
- Measure the current flow and voltage drop in a parallel circuit.
- Construct a series-parallel circuit using various components.
- Calculate the total resistance, voltage, and current in a series-parallel circuit.
- Calculate the total capacitance of a series-parallel circuit with capacitors.
- Explain how an automobile can use a one-wire system to operate its electrical components.
- Design a voltage divider circuit.
- Explain the purpose of a Wheatstone bridge and construct one.

INSTRUCTIONAL STRATEGIES/ACTIVITIES:

- Unit presentation
- Unit workbook activity
- Unit Review Activities
- Hands on Electronics Construction Activity

ANCHOR VOCABULARY:

ASSESSMENTS (Diagnostic/Benchmark/Formative/Summative):

- Unit Packet (Formative)
- Unit Assessment (Summative)
  - Test Your Knowledge, Text, page 133
  - Chapter 6, 7, & 8 Quiz

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.):

- Electricity and Basic Electronics- Textbook- Goodheart-Wilcox(2014)

RESOURCE SPECIFIC VOCABULARY:

EQUIVALENT CIRCUIT PARALLEL CIRCUIT SERIES CIRCUIT VOLTAGE DROP
CONDUCTANCE CHASSIS GROUND OPEN CIRCUIT VOLTAGE DIVIDER

E&BE UNIT 7- LCR Circuits

PA STANDARDS:

- 3.2.10.B: Identify and demonstrate safe practices in the use of technology.
- 3.2.10.C: Use appropriate tools and techniques to measure, test, and analyze data.
- 3.1.10.B: Demonstrate the relationship between electric current, voltage, and resistance.

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

- 2302 Define and describe basic terms in electricity and electronics.
- 2303 Identify electrical and electronic symbols on a schematic.
- 2304 Follow a schematic and construct series and parallel electrical and electronic circuits.
- 2308 Compute values of current, resistance, and voltage using Ohm's law.
- 2310 Analyze and measure values in AC circuits, including inductance, capacitance, reactance, and LRC circuits.
- 2311 Calculate voltage, amperage, resistance, and power in all types of circuits.
- 2312 Troubleshoot all types of circuits.

UNIT OBJECTIVES (SWBATS):

- Calculate the impedance of an LCR circuit.
- Determine the voltage and current of an LCR circuit.
- Describe what is meant by a resonant circuit.
- Explain how a radio is tuned.

INSTRUCTIONAL STRATEGIES/ACTIVITIES:

- Unit presentation
- Unit workbook activity
- Unit Review Activities
- Hands on Electronics Construction Activity

ANCHOR VOCABULARY:

ASSESSMENTS (Diagnostic/Benchmark/Formative/Summative):

- Unit Packet (Formative)
- Unit Assessment (Summative)
    - Test Your Knowledge, Text, page 273
    - Chapter 15 Quiz

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.):

- Electricity and Basic Electronics- Textbook- Goodheart-Wilcox(2014)

RESOURCE SPECIFIC VOCABULARY:

LCR CIRCUIT MULTICASTING RESONANCE

ROBOTICS

PA STANDARDS:

- 3.2.10.B: Identify and demonstrate safe practices in the use of technology.
- 3.2.10.C: Use appropriate tools and techniques to measure, test, and analyze data.
- 3.1.10.B: Demonstrate the relationship between electric current, voltage, and resistance.

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

- 2302 Define and describe basic terms in electricity and electronics.
- 2303 Identify electrical and electronic symbols on a schematic.
- 2304 Follow a schematic and construct series and parallel electrical and electronic circuits.
- 2308 Compute values of current, resistance, and voltage using Ohm's law.
- 2310 Analyze and measure values in AC circuits, including inductance, capacitance, reactance, and LRC circuits.
- 2311 Calculate voltage, amperage, resistance, and power in all types of circuits.
- 2312 Troubleshoot all types of circuits.

UNIT OBJECTIVES (SWBATS):

- Calculate the impedance of an LCR circuit.
- Determine the voltage and current of an LCR circuit.
- Describe what is meant by a resonant circuit.
- Explain how a radio is tuned.

INSTRUCTIONAL STRATEGIES/ACTIVITIES:

- Unit presentation
- Unit workbook activity
- Unit Review Activities
- Hands on Electronics Construction Activity

ANCHOR VOCABULARY:

ASSESSMENTS (Diagnostic/Benchmark/Formative/Summative):

- Unit Packet (Formative)
- Unit Assessment (Summative)
    - Test Your Knowledge, Text, page 273
    - Chapter 15 Quiz

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.):

- Electricity and Basic Electronics- Textbook- Goodheart-Wilcox(2014)

RESOURCE SPECIFIC VOCABULARY:

LCR CIRCUIT MULTICASTING RESONANCE

Advanced CAD UNIT 1: Parametric Modeling Fundamentals

PA STANDARDS:

- 3.4.10.A: Use appropriate tools and techniques to communicate design ideas.
- 3.4.10.B: Apply the engineering design process to solve problems and create prototypes.
- 3.2.10.A: Relate structure and function in engineering contexts.
- 3.2.10.C: Use appropriate technology tools for analysis and communication.
- 9.1.12.A: Understand and use media, techniques, and processes related to visual arts, which can include digital modeling.
- CC.2.3.HS.A.14: Apply geometric concepts to model and solve real world problems.

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

- 608 Prepare additional views to clarify the design.
- 609 Apply principles of dimensioning and annotation.
- 610 Prepare drawings for product assembly, fabrication, or construction.
- 611 Create schematics.
- 612 Revise an existing drawing to meet modifications or changes.

UNIT OBJECTIVES (SWBATS):

- Create Simple Extruded Solid Models
- Understand the Basic Parametric Modeling Procedure
- Create 2-D Sketches
- Understand the "Shape before Size" Approach
- Use the Dynamic Viewing Commands
- Create and Edit Parametric Dimensions

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

RESOURCE SPECIFIC VOCABULARY:

- **N/A**

Advanced CAD UNIT 2: Constructive Solid Geometry Concepts

PA STANDARDS:

- 3.4.10.A: Use appropriate tools and techniques to communicate design ideas.
- 3.4.10.B: Apply the engineering design process to solve problems and create prototypes.
- 3.2.10.A: Relate structure and function in engineering contexts.
- 3.2.10.C: Use appropriate technology tools for analysis and communication.
- 9.1.12.A: Understand and use media, techniques, and processes related to visual arts, which can include digital modeling.
- CC.2.3.HS.A.14: Apply geometric concepts to model and solve real world problems.

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

- 608 Prepare additional views to clarify the design.
- 609 Apply principles of dimensioning and annotation.
- 610 Prepare drawings for product assembly, fabrication, or construction.
- 611 Create schematics.
- 612 Revise an existing drawing to meet modifications or changes.

UNIT OBJECTIVES (SWBATS):

- Understand Constructive Solid Geometry Concepts
- Create a Binary Tree
- Understand the Basic Boolean Operations
- Setup GRID and SNAP Intervals
- Understand the Importance of Order of Features
- Create Placed Features
- Use the Different Extrusion Options

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

RESOURCE SPECIFIC VOCABULARY:

- **N/A**

Advanced CAD UNIT 3: Geometric Constructions

PA STANDARDS:

- 3.4.10.A: Use appropriate tools and techniques to communicate design ideas.
- 3.4.10.B: Apply the engineering design process to solve problems and create prototypes.
- 3.2.10.A: Relate structure and function in engineering contexts.
- 3.2.10.C: Use appropriate technology tools for analysis and communication.
- 9.1.12.A: Understand and use media, techniques, and processes related to visual arts, which can include digital modeling.
- CC.2.3.HS.A.14: Apply geometric concepts to model and solve real world problems.

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

- 608 Prepare additional views to clarify the design.
- 609 Apply principles of dimensioning and annotation.
- 610 Prepare drawings for product assembly, fabrication, or construction.
- 611 Create schematics.
- 612 Revise an existing drawing to meet modifications or changes.

UNIT OBJECTIVES (SWBATS):

- Understand the Classic Geometric Construction Tools and Methods
- Create Geometric Relations
- Use Dimensional Variables
- Display, Add, and Delete Geometric Relations
- Understand and Apply Different Geometric Relations
- Display and Modify Parametric Relations
- Create Fully Defined Sketches

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

RESOURCE SPECIFIC VOCABULARY:

- **N/A**

Advanced CAD UNIT 4: Model History Tree

PA STANDARDS:

- 3.4.10.A: Use appropriate tools and techniques to communicate design ideas.
- 3.4.10.B: Apply the engineering design process to solve problems and create prototypes.
- 3.2.10.A: Relate structure and function in engineering contexts.
- 3.2.10.C: Use appropriate technology tools for analysis and communication.
- 9.1.12.A: Understand and use media, techniques, and processes related to visual arts, which can include digital modeling.
- CC.2.3.HS.A.14: Apply geometric concepts to model and solve real world problems.

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

- 606 Apply line conventions.
- 607 Prepare orthographic projection drawings.
- 608 Prepare additional views to clarify the design.
- 609 Apply principles of dimensioning and annotation.
- 610 Prepare drawings for product assembly, fabrication, or construction.
- 611 Create schematics.
- 612 Revise an existing drawing to meet modifications or changes.

UNIT OBJECTIVES (SWBATS):

- Understand Feature Interactions
- Use the Part Browser
- Modify and Update Feature Dimensions
- Perform History-Based Part Modifications
- Change the Names of Created Features
- Implement Basic Design Changes

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

RESOURCE SPECIFIC VOCABULARY:

- **N/A**

Advanced CAD UNIT 5: Geometric Construction Tools

PA STANDARDS:

- 3.4.10.A: Use appropriate tools and techniques to communicate design ideas.
- 3.2.10.A: Relate structure and function in engineering contexts.
- 3.2.10.C: Use appropriate technology tools for analysis and communication.
- 9.1.12.A: Understand and use media, techniques, and processes related to visual arts, which can include digital modeling.
- CC.2.3.HS.A.14: Apply geometric concepts to model and solve real world problems.

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

- 610 Prepare drawings for product assembly, fabrication, or construction.
- 611 Create schematics.
- 612 Revise an existing drawing to meet modifications or changes.

UNIT OBJECTIVES (SWBATS):

- Applying Geometry Constraints
- Use the Trim/Extend Command
- Use the Offset Command
- Understand the Profile Sketch Approach
- Create Projected Geometry
- Understanding and Using Reference Geometry
- Edit with Click and Drag
- Using the Auto Dimension 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
- Inventor Quick Start Resources- Inventor Quick Start Guide | Autodesk https://www.autodesk.com/learn/ondemand/curated/inventor-quick-start-guide

RESOURCE SPECIFIC VOCABULARY:

- **N/A**

Advanced CAD UNIT 6: Ortho Projection using the BORN Technique

PA STANDARDS:

- 3.4.10.A: Use appropriate tools and techniques to communicate design ideas.
- 3.2.10.A: Relate structure and function in engineering contexts.
- 3.2.10.C: Use appropriate technology tools for analysis and communication.
- 9.1.12.A: Understand and use media, techniques, and processes related to visual arts, which can include digital modeling.
- CC.2.3.HS.A.14: Apply geometric concepts to model and solve real world problems.

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

- 606 Apply line conventions.
- 607 Prepare orthographic projection drawings.
- 608 Prepare additional views to clarify the design.
- 609 Apply principles of dimensioning and annotation.

UNIT OBJECTIVES (SWBATS):

- Understand the Basic Orthographic Projection Principles
- Be able to Perform 1st and 3rd Angle Projections
- Understand the Concept and Usage of the BORN Technique
- Understand the Importance of Parent/Child Relations in Features
- Use the Suppress Feature Option
- Resolve Undesired Feature Interactions
- Create Drawing Layouts from Solid Models

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

RESOURCE SPECIFIC VOCABULARY:

- **N/A**

Advanced CAD UNIT 7: Dimensioning and Notes

PA STANDARDS:

- 3.4.10.A: Use appropriate tools and techniques to communicate design ideas.
- 3.2.10.A: Relate structure and function in engineering contexts.
- 3.2.10.C: Use appropriate technology tools for analysis and communication.
- 9.1.12.A: Understand and use media, techniques, and processes related to visual arts, which can include digital modeling.
- CC.2.3.HS.A.14: Apply geometric concepts to model and solve real world problems.

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

- 609 Apply principles of dimensioning and annotation.
- 610 Prepare drawings for product assembly, fabrication, or construction.
- 612 Revise an existing drawing to meet modifications or changes.

UNIT OBJECTIVES (SWBATS):

- Understand Dimensioning Nomenclature and Basics
- Understand Associative Functionality
- Using the default Sheet Formats
- Arrange and Manage 2D Views in Drawing Mode
- Display and Hide Feature Dimensions
- Create Reference Dimensions
- Understand Edit Sheet and Edit Sheet Format Modes
- Create 3D annotations in Isometric views

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

RESOURCE SPECIFIC VOCABULARY:

- **N/A**