Monroe Career & Technical Institute

Course: Electrical Technology

Unit Name: L1600 - COMMERCIAL AND INDUSTRIAL WIRING
Number: L-1600 **Hours:** 175.00
Dates: Spring 2025

Description/Objectives:

Student will know and be able to demonstrate installation of a variety of raceways, interpret commercial and industrial building plans and specifications, install a three-phase service panel, demonstrate three-phase GFCI protection, wire an industrial control center, demonstrate hydraulic tool systems, core-hole drilling and install an Arc-Fault Circuit Interrupter (AFCI).

Tasks:

Standards / Assessment Anchors

Focus Anchor/Standard #1:

- 13.2.11 E Demonstrate, in the career acquisition process, the application of essential workplace skills/knowledge, such as, but not limited to: commitment, communication, dependability, health/safety, laws and regulations (that is Americans with Disabilities Act, Child Labor Law, Fair Labor Standards Act, OSHA, Material Safety Data Sheets), personal initiative, Self-advocacy, scheduling/time management, team building, technical literacy and technology.

  Supporting Anchor/Standards:

  3.4.10.A2 Interpret how systems thinking applies logic and creativity with appropriate comprises in complex real-life problems.
  3.4.10.C1 Apply the components of the technological design process.
  3.4.10.D2 Diagnose a malfunctioning system and use tools, materials, and knowledge to repair it.
  3.4.12.B1 Analyze ethical, social, economic, and cultural considerations as related to the development, selection, and use of technologies.
  3.4.12.C3 Apply the concept that many technological problems require a multi-disciplinary approach.
  3.2.10.B4 Describe quantitatively the relationships between voltage, current, and resistance to electrical energy and power. Describe the relationship between electricity and magnetism as two aspects of a single electromagnetic force.
  3.4.12.E3 Compare and contrast energy and power systems as they relate to pollution, renewable and non-renewable resources, and conservation.

Focus Anchor/Standard #2:

- CC.3.5.11-12.C. Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.

  Supporting Anchor/Standards:

  CC.2.1.HS.F.2 Apply properties of rational and irrational numbers to solve real world or mathematical problems.
  CC.2.1.HS.F.4 Use units as a way to understand problems and to guide the solution of multi-step problems.
  CC.2.1.HS.F.5 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.
  CC.2.1.HS.F.6 Extend the knowledge of arithmetic operations and apply to complex numbers.

Connecting Anchor/Standard:

- CC.2.1.6.E.2 Identify and choose appropriate processes to compute fluently with multi-digit numbers.

Supporting Anchor/Standards:

CC.2.1.7.D.1 Analyze proportional relationships and use them to model and solve real-world and mathematical problems.

CC.2.2.7.B.3 Model and solve real-world and mathematical problems by using and connecting numerical, algebraic, and/or graphical representations.

CC.2.3.7.A.1 Solve real-world and mathematical problems involving angle measure, area, surface area, circumference, and volume.

CC.2.3.8.A.1 Apply the concepts of volume of cylinders, cones, and spheres to solve real-world and mathematical problems.

CC.2.4.5.A.1 Solve problems using conversions within a given measurement system.

Instructional Activities:

Knowledge:

Participate in theory lesson, take notes, and respond to questions

Complete Term Sheet

Complete Assignment Sheet

Complete individual and group projects

Memorize essential vocabulary

Calculate loads for single-phase and three-phase branch circuits

Calculate ampacity for sing-phase and three-phase loads

Use load calculations to determine branch circuit conductor sizes

Use NEC Table 220.55 to calculate residential cooking equipment loads

Describe the purpose of switchgear

Describe the four general classifications of circuit breakers and list the major circuit breaker ratings

Describe switchgear construction, metering layouts, wiring requirements, and maintenance

List NEC requirements pertaining to switchgear

Describe the visual and mechanical inspections and electrical tests associated with low-voltage and medium-voltage cables, metal-enclosed bus ways, and metering and instrumentation

Describe a ground fault relay system and explain how to test it

Define the various classifications of hazardous locations

Describe the wiring methods permitted for branch circuits and feeders in specific hazardous locations

Explain how the lighting terms lumen, candlepower, and foot-candle related to one another

Classify lighting fixtures by layout, location, fixture type, and type of service

Identify the basic design configurations of incandescent, fluorescent and HID lighting fixtures and describe the general lighting pattern produced by each type

Identify the main lighting requirements associated with lighting systems used in selected applications such as office buildings, schools, theaters, etc.

Identify the special wiring and dimming system components used with incandescent, fluorescent, and HID lighting systems

Skill:

Size Branch circuit over current protection devices for noncontinuous duty and continuous duty circuits

Apply derating factors to size branch circuits

Select branch circuit conductors and over current protection devices for electric heat, air conditioning equipment, motors, and welders

Select wiring methods for Class I, Class II, and Class III hazardous locations

Follow NEC requirements for installing explosion proof fittings in specific hazardous locations

Use manufacturers' lighting fixture catalogs to select the appropriate lighting fixtures for specific lighting applications

Explain the basic differences between emergency systems, legally required standby systems, and optional standby systems

Describe the operating principles of an engine-driven standby AC generator

Describe the different types and characteristics of standby and emergency generators

Recognize and describe the operating principles of both automatic and manual transfer switches

Recognize the different types of storage batteries used in emergency and standby systems and explain how batteries charge and discharge

For selected types of batteries, describe their characteristics, applications, maintenance, and testing

Recognize double-conversion and single-conversion types of uninterruptible power supplies and describe how they operate

Describe the NEC requirements that pertain to the installation of standby and emergency power systems

Remediation:
Re-teach major concepts
Worksheets
Individual Tutoring
Peer Tutoring
Study Guides

Enrichment:
Begin next task when the previous task is satisfactorily completed
Complete a safety review of the program
Assist another student

Safety:

Student must:
Handle material in a safe and work like manner
Use protective clothing and equipment
Use hand tools in a safe manner
Use adequate ventilation when working in enclosed area
Follow manufacturer’s directions when using any product, tool, equipment, etc.
Use proper safety precautions when using /operating hand tools
Use tools and equipment in a professional work like manner according to OSHA standards
Know and follow the established safety rules at all times
Wear work boots with thick cleats
Wear blue jeans & Electrical Technology tee-shirt (all cotton)
Review “Safety Factor” notes before beginning work
Wear safety glasses at all times while working
Check that work station disconnect is in the off position
Any tool not in your hand is to be in your tool pouch
Follow manufacturer's directions when using any product, tool, equipment, etc.
Use proper safety precautions when using / operating hand too

Assessment:

Rubrics
Quizzes
Worksheets
Project
Practical
Tests
Complete packet questions
Complete questions

Resources/Equipment:

Fletcher, G. (2005). Residential Construction Academy: House Wiring, Instructor's Resource Guide, 3rd Edition. Delmar Cengage Learning: Clifton Park: NY. Fletcher, G. (2011). Residential Construction Academy: House Wiring, Instructor's Resource Guide, 3rd Edition. Delmar Cengage Learning: Clifton Park: NY. National Center for Construction Education and Research (NCCER). (2000). Core Curriculum, Annotated Instructor's Guide. Upper Saddle River, NJ: Prentice Hall. NCCER. (2003). Residential Electrical I, Annotated Instructor's Guide. Upper Saddle River, NJ: Prentice Hall. Mullin, R.C. & Simmons, P.(2010). Electrical Wiring Commercial, 12th Ed. Delmar Cengage Learning: Clifton Park: NY. Herman, S. (2010). Electrical Wiring Industrial, 12th Ed. Delmar Cengage Learning: Clifton Park: NY. NCCER. (2005). Level 3. Upper Saddle River, NJ: Prentice Hall. NCCER. (2005). Level 4. Upper Saddle River, NJ: Prentice Hall. NEC 2011 Electricians Tool Pouch with assorted tools: lineman's pliers, electrician's knife, T-strippers, etc. Ridged conduit Threading dies Head conduit stand Oil and pump Ridged bender (conduit) 3 phase service panelHyperlinks: https://www.youtube.com/watch?v=ZT2IVW7gIVk

https://www.youtube.com/watch?v=VaJGxVmjoHo

Monroe Career & Technical Institute

Course: Electrical Technology

Unit Name: L1500 - BASIC MOTOR CONTROL
Number: L-1500 **Hours:** 165.00
Dates: Spring 2025

Description/Objectives:

Student will know and be able to describe, identify, and perform basic motor control functions.

Tasks:

Standards / Assessment Anchors

Focus Anchor/Standard #1:

- 13.2.11.E Demonstrate, in the career acquisition process, the application of essential workplace skills/knowledge, such as, but not limited to: commitment, communication, dependability, health/safety, laws and regulations (that is Americans With Disabilities Act, Child Labor Law, Fair Labor Standards Act, OSHA, Material Safety Data Sheets), personal initiative, Self-Advocacy, scheduling/time management, team building, technical literacy and technology.

  Supporting Anchor/Standards:

  3.4.10.C1 Apply the components of the technological design process.
  3.4.10.D2 Diagnose a malfunctioning system and use tools, materials, and knowledge to repair it.
  3.412.B1 Analyze ethical, social, economic, and cultural considerations as related to the development, selection, and use of technologies.
  3.4.12.C3 Apply the concept that many technological problems require a multi-disciplinary approach.
  3.2.10.B4 Describe quantitatively the relationships between voltage, current, and resistance to electrical energy and power. Describe the relationship between electricity and magnetism as two aspects of a single electromagnetic force.
  3.4.12.E3 Compare and contrast energy and power systems as they relate to pollution, renewable and non-renewable resources, and conservation.

Focus Anchor/Standard #2:

- CC.3.5.11-12.J By the end of grade 12, read and comprehend science/technical texts in the grades 11–12 text complexity band independently and proficiently.

  Supporting Anchor/Standards:

  CC.2.1.HS.F.2 Apply properties of rational and irrational numbers to solve real world or mathematical problems.
  CC.2.1.HS.F.4 Use units as a way to understand problems and to guide the solution of multi-step problems.
  CC.2.1.HS.F.5 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.
  CC.2.1.HS.F.6 Extend the knowledge of arithmetic operations and apply to complex numbers.

Connecting Anchor/Standard:

- CC.2.1.6.E.2 Identify and choose appropriate processes to compute fluently with multi-digit numbers.

  Supporting Anchor/Standards:

  CC.2.1.7.D.1 Analyze proportional relationships and use them to model and solve real-world and mathematical problems.
  CC.2.2.7.B.3 Model and solve real-world and mathematical problems by using and connecting numerical, algebraic, and/or graphical representations.

CC.2.3.7.A.1 Solve real-world and mathematical problems involving angle measure, area, surface area, circumference, and volume.
CC.2.3.8.A.1 Apply the concepts of volume of cylinders, cones, and spheres to solve real-world and mathematical problems.
CC.2.4.5.A.1 Solve problems using conversions within a given measurement system.

Instructional Activities:

Knowledge:
Read Learning Activity Packets
Complete handouts
Participate in theory lesson, take notes, and respond to questions
Complete Term Sheet
Complete Assignment Sheet
Complete individual and group projects
Memorize essential vocabulary

Skill:
Describe the function of five common standards associated with motor control
Describe the operation of three phase power
Describe the operation of grounded and ungrounded systems
Explain why time delay fuses are used with motor starting circuits
Describe three important factors to consider with overcurrent devices
Connect a dual voltage three phase motor for low voltage operation

Remediation:
Re-teach major concepts
Worksheets
Individual Tutoring
Peer Tutoring
Study Guides

Enrichment:
Begin next task when the previous task is satisfactorily completed
Complete a safety review of the program
Assist another student

Safety:

Student must:
Handle material in a safe and work like manner
Use protective clothing and equipment
Use hand tools in a safe manner
Use adequate ventilation when working in enclosed area
Follow manufacturer’s directions when using any product, tool, equipment, etc.
Use proper safety precautions when using /operating hand tools
Use tools and equipment in a professional work like manner according to OSHA standards
Know and follow the established safety rules at all times
Wear work boots with thick cleats
Wear blue jeans & Electrical Technology tee-shirt (all cotton)
Review “Safety Factor” notes before beginning work
Wear safety glasses at all times while working
Check that work station disconnect is in the off position
Any tool not in your hand is to be in your tool pouch
Follow manufacturer's directions when using any product, tool, equipment, etc.
Use proper safety precautions when using / operating hand tools

Assessment:

Rubrics
Quizzes
Worksheets
Project
Practicals
Tests
Complete packet questions
Complete questions

Resources/Equipment:

Fletcher, G. (2005). Residential Construction Academy: House Wiring, Instructor's Resource Guide, 3rd Edition. Delmar Cengage Learning: Clifton Park: NY. Fletcher, G. (2011). Residential Construction Academy: House Wiring, Instructor's Resource Guide, 3rd Edition. Delmar Cengage Learning: Clifton Park: NY. National Center for Construction Education and Research (NCCER). (2000). Core Curriculum, Annotated Instructor's Guide. Upper Saddle River, NJ: Prentice Hall. NCCER. (2003). Residential Electrical I, Annotated Instructor's Guide. Upper Saddle River, NJ: Prentice Hall. NEC 2012 Electricians Tool Pouch with assorted tools: lineman's pliers, electrician's knife, T-strippers, etc. Amatrol motor control trainerHyperlinks: https://www.youtube.com/watch?v=aml0VGzNXEo

Monroe Career & Technical Institute

Course: Electrical Technology

Unit Name: L1700 - BASIC PROGRAMMABLE LOGIC CONTROLLERS
Number: L-1700 **Hours:** 35.00
Dates: Spring 2025

Description/Objectives:

student will know and be able to design, program and operate the PLC to control a number of process applications used by industry.

Tasks:

Standards / Assessment Anchors

Focus Anchor/Standard #1:

- 13.2.11 E Demonstrate, in the career acquisition process, the application of essential workplace skills/knowledge, such as, but not limited to: commitment, communication, dependability, health/safety, laws and regulations (that is Americans with Disabilities Act, Child Labor Law, Fair Labor Standards Act, OSHA, Material Safety Data Sheets), personal initiative, Self-advocacy, scheduling/time management, team building, technical literacy and technology.

  Supporting Anchor/Standards:

  3.4.10.A2 Interpret how systems thinking applies logic and creativity with appropriate comprises in complex real-life problems.
  3.4.10.C1 Apply the components of the technological design process.
  3.4.10.D2 Diagnose a malfunctioning system and use tools, materials, and knowledge to repair it.
  3.4.12.B1 Analyze ethical, social, economic, and cultural considerations as related to the development, selection, and use of technologies.
  3.4.12.C3 Apply the concept that many technological problems require a multi-disciplinary approach.
  3.2.10.B4 Describe quantitatively the relationships between voltage, current, and resistance to electrical energy and power. Describe the relationship between electricity and magnetism as two aspects of a single electromagnetic force.
  3.4.12.E3 Compare and contrast energy and power systems as they relate to pollution, renewable and non-renewable resources, and conservation.

Focus Anchor/Standard #2:

- CC.3.5.11-12.C Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.

  Supporting Anchor/Standards:

  CC.2.1.HS.F.2 Apply properties of rational and irrational numbers to solve real world or mathematical problems.
  CC.2.1.HS.F.4 Use units as a way to understand problems and to guide the solution of multi-step problems.
  CC.2.1.HS.F.5 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.
  CC.2.1.HS.F.6 Extend the knowledge of arithmetic operations and apply to complex numbers.

Connecting Anchor/Standard:

- CC.2.1.6.E.2 Identify and choose appropriate processes to compute fluently with multi-digit numbers.

  Supporting Anchor/Standards:

CC.2.1.7.D.1 Analyze proportional relationships and use them to model and solve real-world and mathematical problems.
CC.2.2.7.B.3 Model and solve real-world and mathematical problems by using and connecting numerical, algebraic, and/or graphical representations.
CC.2.3.7.A.1 Solve real-world and mathematical problems involving angle measure, area, surface area, circumference, and volume.
CC.2.3.8.A.1 Apply the concepts of volume of cylinders, cones, and spheres to solve real-world and mathematical problems.
CC.2.4.5.A.1 Solve problems using conversions within a given measurement system.

Instructional Activities:

Knowledge
Participate in theory lesson, take notes, and respond to questions
Complete Term Sheet
Complete Assignment Sheet
Complete individual and group projects
Memorize essential vocabulary

Skill:
Define PLC
Describe the functions and basic operations of PLC
Download a PLC processor file
Run a PLC processor file
Explain a ladder diagram
Create a ladder diagram

Remediation:
Re-teach major concepts
Worksheets
Individual Tutoring
Peer Tutoring
Study Guides

Enrichment:
Begin next task when the previous task is satisfactorily completed
Complete a safety review of the program
Assist another student

Safety:

Handle material in a safe and work like manner
Use protective clothing and equipment
Use hand tools in a safe manner
Use adequate ventilation when working in enclosed area
Follow manufacturer’s directions when using any product, tool, equipment, etc.
Use proper safety precautions when using /operating hand tools
Use tools and equipment in a professional work like manner according to OSHA standards
Know and follow the established safety rules at all times
Wear work boots with thick cleats
Wear blue jeans & Electrical Technology tee-shirt (all cotton)
Review “Safety Factor” notes before beginning work
Wear safety glasses at all times while working
Check that work station disconnect is in the off position
Any tool not in your hand is to be in your tool pouch
Follow manufacturer's directions when using any product, tool, equipment, etc.
Use proper safety precautions when using / operating hand tools

Assessment:

Rubrics
Quizzes
Worksheets
Project
Practicals
Tests
Complete packet questions
Complete questions

Resources/Equipment:

Fletcher, G. (2005). Residential Construction Academy: House Wiring, Instructor's Resource Guide, 3rd Edition. Delmar Cengage Learning: Clifton Park: NY. Fletcher, G. (2011). Residential Construction Academy: House Wiring, Instructor's Resource Guide, 3rd Edition. Delmar Cengage Learning: Clifton Park: NY. National Center for Construction Education and Research (NCCER). (2000). Core Curriculum, Annotated Instructor's Guide. Upper Saddle River, NJ: Prentice Hall. NCCER. (2003). Residential Electrical I, Annotated Instructor's Guide. Upper Saddle River, NJ: Prentice Hall. NEC 2012 Dunning, Gary (2002)Introduction To Programmable Logic Controllers, 2nd Edition. Delmar Cengage Learning: Clifton Park: NY.Hyperlinks: https://www.youtube.com/watch?v=y2eWdLk0-Ho

Monroe Career & Technical Institute

Course: Electrical Technology

Unit Name: L1800 - PNEUMATIC CONTROL
Number: L-1800 **Hours:** 80.00
Dates: Spring 2025

Description/Objectives:

Student will know and be able to demonstrate knowledge of basic pneumatic power circuit characteristics and identify various components, pneumatic motor performance and electrical control of pneumatic system.

Tasks:

Standards / Assessment Anchors

Focus Anchor/Standard #1:

- 13.2.11 E Demonstrate, in the career acquisition process, the application of essential workplace skills/knowledge, such as, but not limited to: commitment, communication, dependability, health/safety, laws and regulations (that is Americans with Disabilities Act, Child Labor Law, Fair Labor Standards Act, OSHA, Material Safety Data Sheets), personal initiative, Self-advocacy, scheduling/time management, team building, technical literacy and technology.

  Supporting Anchor/Standards:

  3.4.12.B1 Analyze ethical, social, economic, and cultural considerations as related to the development, selection, and use of technologies.
  3.4.12.C3 Apply the concept that many technological problems require a multi-disciplinary approach.
  3.3.12.A2 Analyze the availability, location, and extraction of Earth's resources. Evaluate the impact of using renewable and nonrenewable energy resources on the Earth's system.
  3.4.10.E7 Evaluate structure design as related to function, considering such factors as style, convenience, safety, and efficiency.
  3.2.10.B4 Describe quantitatively the relationships between voltage, current, and resistance to electrical energy and power. Describe the relationship between electricity and magnetism as two aspects of a single electromagnetic force.
  3.4.12.E3 Compare and contrast energy and power systems as they relate to pollution, renewable and non-renewable resources, and conservation.

Focus Anchor/Standard #2:

- CC.3.6.11-12.B. Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.

  Supporting Anchor/Standards:

  CC.2.1.HS.F.2 Apply properties of rational and irrational numbers to solve real world or mathematical problems.
  CC.2.1.HS.F.4 Use units as a way to understand problems and to guide the solution of multi-step problems.
  CC.2.1.HS.F.5 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.
  CC.2.1.HS.F.6 Extend the knowledge of arithmetic operations and apply to complex numbers.

Connecting Anchor/Standard:

- CC.2.2.7.B.3 Model and solve real-world and mathematical problems by using and connecting numerical, algebraic, and/or graphical representations.

  Supporting Anchor/Standards:

  CC.2.1.6.E.2 Identify and choose appropriate processes to compute fluently with multi-digit numbers.
  CC.2.1.7.D.1 Analyze proportional relationships and use them to model and solve real-world and

mathematical problems.
CC.2.3.7.A.1 Solve real-world and mathematical problems involving angle measure, area, surface area, circumference, and volume.
CC.2.3.8.A.1 Apply the concepts of volume of cylinders, cones, and spheres to solve real-world and mathematical problems.
CC.2.4.5.A.1 Solve problems using conversions within a given measurement system.

Instructional Activities:

Knowledge:
Read Learning Activity Packets
Complete handouts
Participate in theory lesson, take notes, and respond to questions
Complete Term Sheet
Complete Assignment Sheet
Complete individual and group projects
Memorize essential vocabulary

Skill:
Define pneumatics
Give an application for a pneumatic system
Describe the basic components of a pneumatic system
Correctly design a pneumatic circuit schematic
Correctly connect a pneumatic circuit
Describe and measure pressure, volume, and force on a pneumatic system

Remediation:
Re-teach major concepts
Worksheets
Individual Tutoring
Peer Tutoring
Study Guides

Enrichment:
Begin next task when the previous task is satisfactorily completed
Complete a safety review of the program
Assist another student

Safety:

Student must:
Handle material in a safe and work like manner
Use protective clothing and equipment
Use hand tools in a safe manner
Use adequate ventilation when working in enclosed area
Follow manufacturer’s directions when using any product, tool, equipment, etc.
Use proper safety precautions when using /operating hand tools
Use tools and equipment in a professional work like manner according to OSHA standards
Know and follow the established safety rules at all times
Wear work boots with thick cleats
Wear blue jeans & Electrical Technology tee-shirt (all cotton)
Review “Safety Factor” notes before beginning work
Wear safety glasses at all times while working
Check that work station disconnect is in the off position
Any tool not in your hand is to be in your tool pouch
Follow manufacturer's directions when using any product, tool, equipment, etc.
Use proper safety precautions when using / operating hand tools

Assessment:

Rubrics
Quizzes
Worksheets
Project
Practicals
Tests
Complete packet questions
Complete questions

Resources/Equipment:

Fletcher, G. (2005). Residential Construction Academy: House Wiring, Instructor's Resource Guide, 3rd Edition. Delmar Cengage Learning: Clifton Park: NY. Fletcher, G. (2011). Residential Construction Academy: House Wiring, Instructor's Resource Guide, 3rd Edition. Delmar Cengage Learning: Clifton Park: NY. National Center for Construction Education and Research (NCCER). (2000). Core Curriculum, Annotated Instructor's Guide. Upper Saddle River, NJ: Prentice Hall. NCCER. (2003). Residential Electrical I, Annotated Instructor's Guide. Upper Saddle River, NJ: Prentice Hall. Electricians Tool Pouch with assorted tools: lineman's pliers, electrician's knife, T-strippers, etc. Pneumatic Trainer NEC 2011Hyperlinks: https://www.youtube.com/watch?v=SR47RaA1Zdk

Monroe Career & Technical Institute

Course: Electrical Technology

Unit Name: L1900 - HYDRAULIC CONTROL
Number: L-1900 **Hours:** 160.00
Dates: Spring 2025

Description/Objectives:

Student will know and be able to demonstrate use of hydraulic power, pressure and force limitations, hydraulic flow rates, velocities, work, and power, direction, force, and speed of cylinders within series or parallel circuits, accumulators circuits, pneumatic motors, pressure reducing valves and remotely controlled pressure relief valves, measure system's hydraulic pump, demonstrate basic electrically controlled hydraulic system, and functional electrically controlled hydraulic system.

Tasks:

Standards / Assessment Anchors
Focus Anchor/Standard #1:

- 13.2.11 E Demonstrate, in the career acquisition process, the application of essential workplace skills/knowledge, such as, but not limited to: commitment, communication, dependability, health/safety, laws and regulations (that is Americans with Disabilities Act, Child Labor Law, Fair Labor Standards Act, OSHA, Material Safety Data Sheets), personal initiative, Self-advocacy, scheduling/time management, team building, technical literacy and technology.

  Supporting Anchor/Standards:

  3.4.10.A2 Interpret how systems thinking applies logic and creativity with appropriate comprises in complex real-life problems.
  3.4.10.C1 Apply the components of the technological design process.
  3.4.12.B1 Analyze ethical, social, economic, and cultural considerations as related to the development, selection, and use of technologies.
  3.4.12.C3 Apply the concept that many technological problems require a multi-disciplinary approach.
  3.3.12.A2 Analyze the availability, location, and extraction of Earth's resources. Evaluate the impact of using renewable and nonrenewable energy resources on the Earth's system.
  3.4.10.E7 Evaluate structure design as related to function, considering such factors as style, convenience, safety, and efficiency.
  3.2.10.B4 Describe quantitatively the relationships between voltage, current, and resistance to electrical energy and power. Describe the relationship between electricity and magnetism as two aspects of a single electromagnetic force.
  3.4.12.E3 Compare and contrast energy and power systems as they relate to pollution, renewable and non-renewable resources, and conservation.

Focus Anchor/Standard #2:

- CC.3.6.11-12.B. Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.

  Supporting Anchor/Standards:

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

Connecting Anchor/Standard:

- CC.2.2.7.B.3 Model and solve real-world and mathematical problems by using and connecting numerical, algebraic, and/or graphical representations.

Supporting Anchor/Standards:

CC.2.1.6.E.2 Identify and choose appropriate processes to compute fluently with multi-digit numbers.
CC.2.1.7.D.1 Analyze proportional relationships and use them to model and solve real-world and mathematical problems.
CC.2.3.7.A.1 Solve real-world and mathematical problems involving angle measure, area, surface area, circumference, and volume.
CC.2.3.8.A.1 Apply the concepts of volume of cylinders, cones, and spheres to solve real-world and mathematical problems.
CC.2.4.5.A.1 Solve problems using conversions within a given measurement system.

Instructional Activities:

Knowledge
Participate in theory lesson, take notes, and respond to questions
Complete Term Sheet
Complete Assignment Sheet
Complete individual and group projects
Memorize essential vocabulary

Skill:
Define hydraulics
Give an application for a hydraulic system
Describe the function of a basic hydraulic system
Describe and measure hydraulic pressure and flow rate
Describe and correctly use flow meters, displacement pumps, and actuators.

Remediation:
Re-teach major concepts
Worksheets
Individual Tutoring
Peer Tutoring
Study Guides

Enrichment:
Begin next task when the previous task is satisfactorily completed
Complete a safety review of the program
Assist another student

Safety:

Student must:
Handle material in a safe and work like manner
Use protective clothing and equipment
Use hand tools in a safe manner
Use adequate ventilation when working in enclosed area
Follow manufacturer’s directions when using any product, tool, equipment, etc.
Use proper safety precautions when using /operating hand tools
Use tools and equipment in a professional work like manner according to OSHA standards
Know and follow the established safety rules at all times
Wear work boots with thick cleats
Wear blue jeans & Electrical Technology tee-shirt (all cotton)
Review “Safety Factor” notes before beginning work
Wear safety glasses at all times while working
Check that work station disconnect is in the off position
Any tool not in your hand is to be in your tool pouch

Follow manufacturer's directions when using any product, tool, equipment, etc.
Use proper safety precautions when using / operating hand tools

Assessment:

Rubrics
Quizzes
Worksheets
Project
Practicals
Tests
Complete packet questions
Complete questions

Resources/Equipment:

Fletcher, G. (2005). Residential Construction Academy: House Wiring, Instructor's Resource Guide, 3rd Edition. Delmar Cengage Learning: Clifton Park: NY. Fletcher, G. (2011). Residential Construction Academy: House Wiring, Instructor's Resource Guide, 3rd Edition. Delmar Cengage Learning: Clifton Park: NY. National Center for Construction Education and Research (NCCER). (2000). Core Curriculum, Annotated Instructor's Guide. Upper Saddle River, NJ: Prentice Hall. NCCER. (2003). Residential Electrical I, Annotated Instructor's Guide. Upper Saddle River, NJ: Prentice Hall. NEC 2012 Electricians Tool Pouch with assorted tools: lineman's pliers, electrician's knife, T-strippers, etc. Hydraulic TrainerHyperlinks: https://www.youtube.com/watch?v=7WbddnjSFyQ

Monroe Career & Technical Institute

Course: Electrical Technology

Unit Name: L2000 TRANSFORMERS, GENERATORS, MOTORS, and ALTERNATORS
Number: L-2000 **Hours:** 15.00
Dates: Spring 2025

Description/Objectives:

Student will know and be able to understand transformers, alternators/generators and batteries. .

Tasks:

Standards / Assessment Anchors
Focus Anchor/Standard #1:

- 13.2.11 E Demonstrate, in the career acquisition process, the application of essential workplace skills/knowledge, such as, but not limited to: commitment, communication, dependability, health/safety, laws and regulations (that is Americans with Disabilities Act, Child Labor Law, Fair Labor Standards Act, OSHA, Material Safety Data Sheets), personal initiative, Self-advocacy, scheduling/time management, team building, technical literacy and technology.

Supporting Anchor/Standards:

3.4.10.A2 Interpret how systems thinking applies logic and creativity with appropriate comprises in complex real-life problems.
3.4.10.C1 Apply the components of the technological design process.
3.4.10.D2 Diagnose a malfunctioning system and use tools, materials, and knowledge to repair it.
3.4.12.B1 Analyze ethical, social, economic, and cultural considerations as related to the development, selection, and use of technologies.
3.4.12.C3 Apply the concept that many technological problems require a multi-disciplinary approach.
3.2.10.B4 Describe quantitatively the relationships between voltage, current, and resistance to electrical energy and power. Describe the relationship between electricity and magnetism as two aspects of a single electromagnetic force.
3.4.12.E3 Compare and contrast energy and power systems as they relate to pollution, renewable and non-renewable resources, and conservation.

Focus Anchor/Standard #2:

- □ CC.3.5.11-12.C. Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.

  Supporting Anchor/Standards:

  CC.2.1.HS.F.2 Apply properties of rational and irrational numbers to solve real world or mathematical problems.
  CC.2.1.HS.F.4 Use units as a way to understand problems and to guide the solution of multi-step problems.
  CC.2.1.HS.F.5 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.
  CC.2.1.HS.F.6 Extend the knowledge of arithmetic operations and apply to complex numbers.

Connecting Anchor/Standard:

- CC.2.1.6.E.2 Identify and choose appropriate processes to compute fluently with multi-digit numbers.

Supporting Anchor/Standards:

CC.2.1.7.D.1 Analyze proportional relationships and use them to model and solve real-world and mathematical problems.

CC.2.2.7.B.3 Model and solve real-world and mathematical problems by using and connecting numerical, algebraic, and/or graphical representations.

CC.2.3.7.A.1 Solve real-world and mathematical problems involving angle measure, area, surface area, circumference, and volume.

CC.2.3.8.A.1 Apply the concepts of volume of cylinders, cones, and spheres to solve real-world and mathematical problems.

CC.2.4.5.A.1 Solve problems using conversions within a given measurement system.

Instructional Activities:

Knowledge:
Participate in theory lesson, take notes, and respond to questions
Complete Term Sheet
Complete Assignment Sheet
Complete individual and group projects
Memorize essential vocabulary

Remediation:
Re-teach major concepts
Worksheets
Individual Tutoring
Peer Tutoring
Study Guides

Skill:
Student will demonstrate understanding by correctly wiring devices according to NEC standards:
Generator
Alternator
Battery bank
Transformer (single-phase)

Enrichment:
Begin next task when the previous task is satisfactorily completed
Complete a safety review of the program
Assist another student

Safety:

Student must:
Handle material in a safe and work like manner
Use protective clothing and equipment
Use hand tools in a safe manner
Use adequate ventilation when working in enclosed area
Follow manufacturer’s directions when using any product, tool, equipment, etc.
Use proper safety precautions when using /operating hand tools
Use tools and equipment in a professional work like manner according to OSHA standards
Know and follow the established safety rules at all times
Wear work boots with thick cleats
Wear blue jeans & Electrical Technology tee-shirt (all cotton)
Review “Safety Factor” notes before beginning work
Wear safety glasses at all times while working
Check that work station disconnect is in the off position
Any tool not in your hand is to be in your tool pouch
Follow manufacturer's directions when using any product, tool, equipment, etc.
Use proper safety precautions when using / operating hand too

Assessment:

Rubrics
Quizzes
Worksheets
Project
Practical
Tests
Complete packet questions
Complete questions

Resources/Equipment:

Fletcher, G. (2005). Residential Construction Academy: House Wiring, Instructor's Resource Guide, 3rd Edition. Delmar Cengage Learning: Clifton Park: NY. Fletcher, G. (2011). Residential Construction Academy: House Wiring, Instructor's Resource Guide, 3rd Edition. Delmar Cengage Learning: Clifton Park: NY. National Center for Construction Education and Research (NCCER). (2000). Core Curriculum, Annotated Instructor's Guide. Upper Saddle River, NJ: Prentice Hall. NCCER. (2003). Residential Electrical I, Annotated Instructor's Guide. Upper Saddle River, NJ: Prentice Hall. Mullin, R.C. & Simmons, P.(2010). Electrical Wiring Commercial, 12th Ed. Delmar Cengage Learning: Clifton Park: NY. Herman, S. (2010). Electrical Wiring Industrial, 12th Ed. Delmar Cengage Learning: Clifton Park: NY. NCCER. (2005). Level 3. Upper Saddle River, NJ: Prentice Hall. NCCER. (2005). Level 4. Upper Saddle River, NJ: Prentice Hall. NEC 2011 Electricians Tool Pouch with assorted tools: lineman's pliers, electrician's knife, T-strippers, etc.Hyperlinks:

Monroe Career & Technical Institute

Course: Electrical Technology

Unit Name: L2100 OTHER RESIDENTIAL ELECTRICAL REQUIREMENTS
Number: L-2100 **Hours:** 54.00
Dates: Spring 2025

Description/Objectives:

Student will know and be able to wire residential buildings and structures such as swimming pools, spas, fountains, hot tubs, outdoor branch lighting circuits, garages, HVAC equipment, and standby power systems.

Tasks:

Standards / Assessment Anchors

Focus Anchor/Standard #1:

- 13.2.11 E Demonstrate, in the career acquisition process, the application of essential workplace skills/knowledge, such as, but not limited to: commitment, communication, dependability, health/safety, laws and regulations (that is Americans with Disabilities Act, Child Labor Law, Fair Labor Standards Act, OSHA, Material Safety Data Sheets), personal initiative, Self-advocacy, scheduling/time management, team building, technical literacy and technology.

  Supporting Anchor/Standards:

  3.4.10.A2 Interpret how systems thinking applies logic and creativity with appropriate comprises in complex real-life problems.
  3.4.10.C1 Apply the components of the technological design process.
  3.4.10.D2 Diagnose a malfunctioning system and use tools, materials, and knowledge to repair it.
  3.4.12.B1 Analyze ethical, social, economic, and cultural considerations as related to the development, selection, and use of technologies.
  3.4.12.C3 Apply the concept that many technological problems require a multi-disciplinary approach.
  3.2.10.B4 Describe quantitatively the relationships between voltage, current, and resistance to electrical energy and power. Describe the relationship between electricity and magnetism as two aspects of a single electromagnetic force.
  3.4.12.E3 Compare and contrast energy and power systems as they relate to pollution, renewable and non-renewable resources, and conservation.

Focus Anchor/Standard #2:

- □ CC.3.5.11-12.C. Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.

  Supporting Anchor/Standards:

  CC.2.1.HS.F.2 Apply properties of rational and irrational numbers to solve real world or mathematical problems.
  CC.2.1.HS.F.4 Use units as a way to understand problems and to guide the solution of multi-step problems.
  CC.2.1.HS.F.5 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.
  CC.2.1.HS.F.6 Extend the knowledge of arithmetic operations and apply to complex numbers.

Connecting Anchor/Standard:

- CC.2.1.6.E.2 Identify and choose appropriate processes to compute fluently with multi-digit numbers.

Supporting Anchor/Standards:

CC.2.1.7.D.1 Analyze proportional relationships and use them to model and solve real-world and mathematical problems.
CC.2.2.7.B.3 Model and solve real-world and mathematical problems by using and connecting numerical, algebraic, and/or graphical representations.
CC.2.3.7.A.1 Solve real-world and mathematical problems involving angle measure, area, surface area, circumference, and volume.
CC.2.3.8.A.1 Apply the concepts of volume of cylinders, cones, and spheres to solve real-world and mathematical problems.
CC.2.4.5.A.1 Solve problems using conversions within a given measurement system.

Instructional Activities:

Knowledge:
Participate in theory lesson, take notes, and respond to questions
Complete Term Sheet
Complete Assignment Sheet
Complete individual and group projects
Memorize essential vocabulary

Skill:

Install outdoor branch lighting circuits.
Install garage lighting and door opener circuits.
Install grounding for second building.
Connect HVAC equipment wiring.

Remediation:
Re-teach major concepts
Worksheets
Individual Tutoring
Peer Tutoring
Study Guides

Enrichment:
Begin next task when the previous task is satisfactorily completed
Complete a safety review of the program
Assist another student

Safety:

Student must:
Handle material in a safe and work like manner
Use protective clothing and equipment
Use hand tools in a safe manner
Use adequate ventilation when working in enclosed area
Follow manufacturer’s directions when using any product, tool, equipment, etc.
Use proper safety precautions when using /operating hand tools
Use tools and equipment in a professional work like manner according to OSHA standards
Know and follow the established safety rules at all times
Wear work boots with thick cleats
Wear blue jeans & Electrical Technology tee-shirt (all cotton)
Review “Safety Factor” notes before beginning work
Wear safety glasses at all times while working
Check that work station disconnect is in the off position
Any tool not in your hand is to be in your tool pouch

Follow manufacturer's directions when using any product, tool, equipment, etc.
Use proper safety precautions when using / operating hand too

Assessment:

Rubrics
Quizzes
Worksheets
Project
Practical
Tests
Complete packet questions
Complete questions

Resources/Equipment:

Fletcher, G. (2005). Residential Construction Academy: House Wiring, Instructor's Resource Guide, 3rd Edition. Delmar Cengage Learning: Clifton Park: NY. Fletcher, G. (2011). Residential Construction Academy: House Wiring, Instructor's Resource Guide, 3rd Edition. Delmar Cengage Learning: Clifton Park: NY. National Center for Construction Education and Research (NCCER). (2000). Core Curriculum, Annotated Instructor's Guide. Upper Saddle River, NJ: Prentice Hall. NCCER. (2003). Residential Electrical I, Annotated Instructor's Guide. Upper Saddle River, NJ: Prentice Hall. Mullin, R.C. & Simmons, P.(2010). Electrical Wiring Commercial, 12th Ed. Delmar Cengage Learning: Clifton Park: NY. NCCER. (2005). Level 3. Upper Saddle River, NJ: Prentice Hall. NCCER. (2005). Level 4. Upper Saddle River, NJ: Prentice Hall. NEC 2011 Electricians Tool Pouch with assorted tools: lineman's pliers, electrician's knife, T-strippers, etc.Hyperlinks:

Monroe Career & Technical Institute

Course: Electrical Technology

Unit Name: 100 - BASIC SAFETY
Number: 100 **Hours:** 50.00
Dates: Spring 2025

Description/Objectives:

Student will know and be able to demonstrate or describe training and career opportunities and characteristics of a professional in the construction industry, identify and avoid hazardous conditions on the job site, identify safe methods and equipment of aerial work, and demonstrate basic fire safety and basic electrical safety.

Tasks:

PA101 - Inspect and use personal protective equipment

PA102 - Identify causes of job site accidents.

PA105 - Properly don fall protection

PA106 - Identify four classes of fire extinguishers

PA107 - Confirm circuits are de-energized before working on them.

PA108 - Perform lockout/tagout.

PA109 - Inspect and use ladders

PA110 - Complete jobsite hazard analysis form

PA111 - Identify arc-flash hazards and protection (NFPA70E).

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.

Instructional Activities:

Knowledge:
Read module
View types of equipment in the shop
Observe demonstration
View Residential Wiring Video
Participate in theory lesson
Take notes
Respond to questions
Complete Reading NCCER Core – Safety Module – Section 1.0
Complete Term Sheet
Complete Assignment Sheet
List safety practice for ladders
List safety practice for scaffold

View video on lockout/tagout procedures
Describe the proper use of the different types of fire extinguishers
Explain the purpose of OSHA and how it promotes safety on the job
Explain safety issues concerning lockout/tagout procedures
Explain personal protection using assured grounding and isolation programs
Explain personal protection using confined space entry
Explain personal protection using respiratory protection
Explain personal protection using fall protection systems
Explain the role that safety plays in the construction crafts
Describe what job-site safety means
Explain the appropriate safety precautions around common job-site hazards
Explain the importance of the HazCom requirement and MSDSs

Skill:
Complete individual projects
Complete group projects
Demonstrate an understanding of both General Safety and Electrical
Demonstrate safe working procedures in a construction environment
Identify electrical hazards and how to avoid or minimize them in the workplace
Demonstrate the proper use of the different types of fire extinguishers
Demonstrate lockout/tagout procedures
Complete requirements for Lockout/Tagout Certification
Demonstrate proper use and inspection of PPE such as hardhats, boots, gloves, safety glasses
Complete requirements for a 10-Hour OSHA Certification
Use a Material Safety Data Sheet
Demonstrate the fall protection system by putting on the harness and lanyard
Find information in the National Electrical Code
Identify different types of ladders
Inspect ladders for damage and safety issues
Demonstrate the proper use of the different types of ladders
Complete a CPR certification program
Identify the responsibilities and personal characteristics of a professional crafts person
Demonstrate the use and care of appropriate personal protective equipment
Follow safe procedures for lifting heavy objects
Describe safe behavior on and around ladders and scaffolds
Describe fire prevention and fire-fighting techniques
Define safe work procedures around electrical hazards
Demonstrate an understanding of the electrical hazards associated
with electrical work.
Demonstrate an understanding of the purpose of the National
Electrical Code®.
Demonstrate an understanding of the arrangement of the National
Electrical Code®.
Cite examples of rules from the National Electrical Code® pertaining to
common residential electrical safety hazards.
Demonstrate an understanding of the purpose of NFPA 70E Standard
for Electrical Safety in the Workplace.
Identify common electrical hazards and how to avoid them on the job.
Demonstrate an understanding of the purpose of OSHA.
Cite specific OSHA provisions pertaining to various general and
electrical safety hazards associated with residential wiring.
Demonstrate an understanding of the personal protective equipment
used by residential electricians.
List several safety practices pertaining to general and electrical safety.
Demonstrate an understanding of material safety data sheets.
Demonstrate an understanding of various classes of fires and the
types of extinguishers used on them.

Remediation:
Re-teach major concepts
Worksheets
Individual Tutoring
Peer Tutoring

Study Guides

Enrichment:
Begin next task when the previous task is satisfactorily completed
Complete a safety review of the program
Assist another student

Special Adaptations:

Extended Time (assignments and/or testing)
Study Guide
Taking Tests in Alternate Setting (or if requested)
Verbal/Gestural Redirection (prompts to remain on task)
Drill and Practice (Repetition of Material)
Small Group Instruction
Provide Visual Model to Accompany Verbal Directions (Written/Oral Directions)
Teacher Modeling
Use of Computer (Access to)
Positive Reinforcement
Have Student Repeat Directions
Wait Time
Provide Frequent Feedback
Provide Frequent Breaks
Variety of Assessment Methods
Use of Assistive Device (i.e. notepad, laptop, ect.)
Highly Structured Classroom
Limited, Short Directions
Grading Rubric
Communication Regarding Behavior & Consequences (PBS)
Clear Language for Directions
Provide Opportunities to Retest
Frequent Review Sessions
Use a variety of Modalities when Introducing Skills/Concepts
Allow Oral Answers for Testing
Copies of Text for Home
Cue for Oral Response
De-Escalation Opportunities
Daily Classwork Check
Encourage Student to Check Work Before Turning In
Opportunities for Repeated Practice of MATH Skills
Provide repetition During Initial Instruction
Allow Pre-read of Questions Before Reading Written Passage
Provide Verbal and Written Directions
All Vocabulary to be Defined Before Testing
Time out
Monitor Speed/Accuracy in which Student Completes Assignment
Encouragement to Participate in Positive Leadership Roles
Student Self-Evaluation for Behavior
Exempt from reading Aloud in Front of Peers

Safety:

Student must:
Handle material in a safe and work like manner
Use protective clothing and equipment
Use hand tools in a safe manner
Use adequate ventilation when working in enclosed area
Follow manufacturer’s directions when using any product, tool, equipment, etc.
Use proper safety precautions when using /operating hand tools
Use tools and equipment in a professional work like manner according to OSHA standards
Know and follow the established safety rules at all times

Wear work boots with thick cleats
Wear blue jeans & Electrical Technology tee-shirt (all cotton)
Review “Safety Factor” notes before beginning work
Wear safety glasses at all times while working
Check that work station disconnect is in the off position
Any tool not in your hand is to be in your tool pouch
Follow manufacturer's directions when using any product, tool, equipment, etc.
Use proper safety precautions when using / operating hand tools

Assessment:

Rubrics
Quizzes
Worksheets
Project
Practicals
Tests
Complete packet questions
Complete questions

Resources/Equipment:

Fletcher, G. (2012). Residential Construction Academy: House Wiring, Instructor's Resource Guide, 3rd Edition. Delmar Cengage Learning: Clifton Park: NY. Fletcher, G. (2011). Residential Construction Academy: House Wiring, Instructor's Resource Guide, 3rd Edition. Delmar Cengage Learning: Clifton Park: NY. National Center for Construction Education and Research (NCCER). (2000). Core Curriculum, Annotated Instructor's Guide. Upper Saddle River, NJ: Prentice Hall. NCCER. (2003). Residential Electrical I, Annotated Instructor's Guide. Upper Saddle River, NJ: Prentice Hall. Module: equipment in electrical trade Step ladders (6”, 8”, 12”) Extension ladders (24”, 32”, 36”) Scaffolds with 3 sections and with planks 20” scaffold plank Lockout/tagout kit NCCER Safety Module, version 001001 NEC Book Version 2011 Workstation/Booth area Demonstration Video 02.01 (Residential Wiring #2) Fire Extinguishers Electricians Tool Pouch with assorted tools: lineman's pliers, electrician's knife, T-strippers PPE: safety glasses, goggles, shield; leather work boots, EH boots: fall harness, lanyard; several types of hardhats; several types of safety glovesHyperlinks: http://www.careersafeonline.com/

https://www.youtube.com/watch?v=Tgtqb56yV4c

Monroe Career & Technical Institute

Course: Electrical Technology

Unit Name: 200 HAND TOOLS
Number: 200 **Hours:** 16.00
Dates: Spring 2025

Description/Objectives:

Student will know and be able to identify, safely use and maintain hand tools.

Tasks:

PA 201 - Use screwdrivers.

PA 202 - Use pliers.

PA 203 - Use keyhole/drywall saw.

PA 204 - Use hydraulic knockout/punch tool.

PA205 - Use a tape measure.

PA206 - Use wire strippers.

PA207 - Use wire cutters.

PA208 - Use a utility knife.

PA209 - Use a torpedo level.

PA210 - Use a hammer.

PA211 - Use a conduit reamer.

PA212 - Use a hacksaw.

PA213 - Use an MC Cable splitter (roto-split).

PA214 - Use an adjustable or non adjustable wrenches.

PA215 - Use a ratchet and sockets.

PA216 - Use nut drivers.

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.

Instructional Activities:

Knowledge:
Read Chapter
Study glossary of terms
Read NEC Book
Complete projects
Participate in theory lesson, take notes, and respond to questions
Complete Term Sheet
Complete Assignment Sheet
Complete individual and group projects
Memorize essential vocabulary
Identify common electrical hand tools and their uses in the residential electrical trade
Identify common specialty tools and their uses in the residential electrical trade
Identify common electrical hand tools and their uses in the residential
electrical trade.
List several guidelines for the care and safe use of electrical hand
tools, specialty tools, and power tools.

Skill:
Complete assigned project
Read a ruler or measuring tape
Identify tools and their use
Understand safety with tools
Choose the right tool for the job at hand
Identify and describe the use of hand tools that are most commonly used by
electricians
Use hand tools in a safe and appropriate manner
Maintain hand tools in suitable working condition
Demonstrate an understanding of the procedures for using several common hand tools such as:
Hammers
Pliers
Saws
Wire Cutters
Screwdrivers
Chisels

Remediation:
Re-teach major concepts
Worksheets
Individual Tutoring
Peer Tutoring
Study Guides

Enrichment:
Begin next task when the previous task is satisfactorily completed
Complete a safety review of the program
Assist another student

Safety:

Student must:
Handle material in a safe and work like manner
Use protective clothing and equipment
Use hand tools in a safe manner
Use adequate ventilation when working in enclosed area
Follow manufacturer’s directions when using any product, tool, equipment, etc.
Use proper safety precautions when using /operating hand tools
Use tools and equipment in a professional work like manner according to OSHA standards
Know and follow the established safety rules at all times
Wear work boots with thick cleats
Wear blue jeans & Electrical Technology tee-shirt (all cotton)
Review “Safety Factor” notes before beginning work
Wear safety glasses at all times while working
Check that work station disconnect is in the off position
Any tool not in your hand is to be in your tool pouch
Follow manufacturer's directions when using any product, tool, equipment, etc.
Use proper safety precautions when using / operating hand tools

Assessment:

Rubrics
Quizzes
Worksheets
Project
Practical
Tests
Complete packet questions
Complete questions

Resources/Equipment:

Fletcher, G. (2005). Residential Construction Academy: House Wiring, Instructor's Resource Guide, 3rd Edition. Delmar Cengage Learning: Clifton Park: NY. Fletcher, G. (2011). Residential Construction Academy: House Wiring, Instructor's Resource Guide, 3rd Edition. Delmar Cengage Learning: Clifton Park: NY. National Center for Construction Education and Research (NCCER). (2000). Core Curriculum, Annotated Instructor's Guide. Upper Saddle River, NJ: Prentice Hall. NCCER. (2003). Residential Electrical I, Annotated Instructor's Guide. Upper Saddle River, NJ: Prentice Hall. screwdrivers pliers wire cutters hammers saws chisels hydraulic tool systemsHyperlinks: https://www.youtube.com/watch?v=Nk6d4SbwmOY

Monroe Career & Technical Institute

Course: Electrical Technology

Unit Name: 300 POWER TOOLS
Number: 300 **Hours:** 45.00
Dates: Spring 2025

Description/Objectives:

Student will know and be able to identify, safely use and maintain power tools.

Tasks:

PA302 - Use a hammer drill.

PA303 - Use a reciprocating saw.

PA304 - Use a portable hand-held band saw.

PA306 - Use a drill.

PA310 - Use an oscillating multi purpose tool.

PA311 - Use impact driver.

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:

  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:
Read Chapter

Complete assigned questions
View demonstration video and take notes
Participate in theory lesson, take notes, and respond to questions
Review safety standards
Complete Term Sheet
Complete Assignment Sheet
Complete individual and group projects
Memorize essential vocabulary
List several guidelines for the care and safe use of electrical hand tools, specialty tools, and power tools

Skills:
Drill holes with electric hammer drill
Demonstrate electrical rigging and knot tying
Cut wood or metal with reciprocating saw
Cut conduit with portable hand-held saw
Cut wood with circular saw
Drill holes with a drill press
Demonstrate electric grinder/buffer safety
Drill holes with electric/cordless drill
Cut wood with portable jig saw
Identify common electrical hand tools and their uses in the residential electrical trade
Identify common specialty tools and their uses in the residential electrical trade
Identify common power tools and their uses in the residential electrical trade
Demonstrate an understanding of the procedures for using several common hand tools, specialty tools, and power tools

Remediation:
Re-teach major concepts
Worksheets
Individual Tutoring
Peer Tutoring
Study Guides

Enrichment:
Begin next task when the previous task is satisfactorily completed
Complete a safety review of the program
Assist another student

Safety:

Student must:
Handle material in a safe and work like manner
Use protective clothing and equipment
Use hand tools in a safe manner
Use adequate ventilation when working in enclosed area
Follow manufacturer’s directions when using any product, tool, equipment, etc.
Use proper safety precautions when using /operating hand tools
Use tools and equipment in a professional work like manner according to OSHA standards
Know and follow the established safety rules at all times
Wear work boots with thick cleats
Wear blue jeans & Electrical Technology tee-shirt (all cotton)
Review “Safety Factor” notes before beginning work
Wear safety glasses at all times while working
Check that work station disconnect is in the off position
Any tool not in your hand is to be in your tool pouch
Follow manufacturer's directions when using any product, tool, equipment, etc.
Use proper safety precautions when using / operating hand tools

Assessment:

Rubrics
Quizzes
Worksheets
Project
Practical
Tests
Complete packet questions
Complete questions

Resources/Equipment:

Fletcher, G. (2005). Residential Construction Academy: House Wiring, Instructor's Resource Guide, 3rd Edition. Delmar Cengage Learning: Clifton Park: NY. Fletcher, G. (2011). Residential Construction Academy: House Wiring, Instructor's Resource Guide, 3rd Edition. Delmar Cengage Learning: Clifton Park: NY. National Center for Construction Education and Research (NCCER). (2000). Core Curriculum, Annotated Instructor's Guide. Upper Saddle River, NJ: Prentice Hall. NCCER. (2003). Residential Electrical I, Annotated Instructor's Guide. Upper Saddle River, NJ: Prentice Hall. Electric hammer drill Reciprocating saw Portable hand-held band saw Circular saw Electric/cordless drill Portable jig saw Portable power conduit threading machine Chain sawHyperlinks: https://www.youtube.com/watch?v=qQnrZeofF84

Monroe Career & Technical Institute

Course: Electrical Technology

Unit Name: 1300 NATIONAL ELECTRICAL CODE
Number: 300 **Hours:** 175.00
Dates: Spring 2025

Description/Objectives:

Student will know and be able to identify publisher, purpose, and layout of NEC and identify code cycle.

Tasks:

PA1301 - Identify the purpose of the National Electrical Code (NEC).

PA1302 - Use Chapter 9 Tables.

PA1303 - Use the NEC as a reference to questions and competencies that students perform for all electrical installations.

PA1304 - Identify the publisher of the National Electrical Code (NEC).

PA1305 - Identify the code cycle of the National Electrical Code (NEC).

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 Academic Standards
  13.3 Career Retention and Advancement

  Supporting Anchor/Standards:
  13.3.11 F. Evaluate strategies for career retention and advancement in response to the changing global workplace. G. Evaluate the impact of lifelong learning on career retention and advancement.
  13.3.11 G. Evaluate the impact of lifelong learning on career retention and advancement.

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

Instructional Activities:

Knowledge:
Read and interpret rules and regulations
Understand the layout of the book
Understand the code cycle

Skill:
Use the NEC for all project and live work

Remediation:
Re-teach major concepts
Worksheets
Individual Tutoring
Peer Tutoring
Study Guides

Enrichment:
Begin next task when the previous task is satisfactorily completed
Complete a safety review of the program
Assist another student

Safety:

Student must:
Handle material in a safe and work like manner
Use protective clothing and equipment
Use hand tools in a safe manner
Use adequate ventilation when working in enclosed area
Follow manufacturer’s directions when using any product, tool, equipment, etc.
Use proper safety precautions when using /operating hand tools
Use tools and equipment in a professional work like manner according to OSHA standards
Know and follow the established safety rules at all times
Wear work boots with thick cleats
Wear blue jeans & Electrical Technology tee-shirt (all cotton)

Review “Safety Factor” notes before beginning work
Wear safety glasses at all times while working
Check that work station disconnect is in the off position
Any tool not in your hand is to be in your tool pouch
Follow manufacturer's directions when using any product, tool, equipment, etc.
Use proper safety precautions when using / operating hand tools

Assessment:

Rubrics
Quizzes
Worksheets
Project
Practicals
Tests
Complete packet questions
Complete questions

Resources/Equipment:

Fletcher, G. (2005). Residential Construction Academy: House Wiring, Instructor's Resource Guide, 3rd Edition. Delmar Cengage Learning: Clifton Park: NY. Fletcher, G. (2011). Residential Construction Academy: House Wiring, Instructor's Resource Guide, 3rd Edition. Delmar Cengage Learning: Clifton Park: NY. National Center for Construction Education and Research (NCCER). (2000). Core Curriculum, Annotated Instructor's Guide. Upper Saddle River, NJ: Prentice Hall. NCCER. (2003). Residential Electrical I, Annotated Instructor's Guide. Upper Saddle River, NJ: Prentice Hall. National Electrical Code Book Version 2011Hyperlinks: https://www.youtube.com/watch?v=OVTS2yDIFM4

Monroe Career & Technical Institute

Course: Electrical Technology

Unit Name: 400 BLUEPRINT READING
Number: 400 **Hours:** 19.00
Dates: Spring 2025

Description/Objectives:

Student will know and be able to plan branch circuits for blueprint development and incorporate electrical details to residential blueprint.

Tasks:

PA401 - Identify types of blueprint plans.

PA402 - Identify blueprint symbols.

PA403 - Interpret blueprint plans.

PA405 - Develop electrical details on a blueprint.

PA406 - Use a measuring tool to scale.

Standards / Assessment Anchors
Focus Anchor/Standard #1:

- Pennsylvania Core Standards for Reading for Technical Subjects Standard 3.5

Supporting Anchor/Standards:

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

Instructional Activities:

Knowledge:
Read Chapter
Complete questions
Draw blueprint of the House Project floor structure according to activity sheet
Participate in theory lesson, take notes, and respond to questions
Complete Term Sheet
Complete Assignment Sheet
Complete individual and group projects

Memorize essential vocabulary

Skills:
Recognize and identify basic blueprint terms, components, and symbols
Relate information on blueprints to actual locations on the print
Recognize the different classifications of drawings
Interpret and use drawing dimensions
Demonstrate an understanding of residential building plans
Identify common architectural symbols found on residential building plans
Determine specific dimensions on a building plan using an architect's scale
Demonstrate and understanding of residential building plan specifications
Demonstrate and understanding of basic residential framing methods and components

Remediation:
Re-teach major concepts
Worksheets
Individual Tutoring
Peer Tutoring
Study Guides

Enrichment:
Begin next task when the previous task is satisfactorily completed
Complete a safety review of the program
Assist another student

Safety:

Student must:
Handle material in a safe and work like manner
Use protective clothing and equipment
Use hand tools in a safe manner
Use adequate ventilation when working in enclosed area
Follow manufacturer’s directions when using any product, tool, equipment, etc.
Use proper safety precautions when using /operating hand tools
Use tools and equipment in a professional work like manner according to OSHA standards
Know and follow the established safety rules at all times
Wear work boots with thick cleats
Wear blue jeans & Electrical Technology tee-shirt (all cotton)
Review “Safety Factor” notes before beginning work
Wear safety glasses at all times while working
Check that work station disconnect is in the off position
Any tool not in your hand is to be in your tool pouch
Follow manufacturer's directions when using any product, tool, equipment, etc.
Use proper safety precautions when using / operating hand tools

Assessment:

Rubrics
Quizzes
Worksheets
Project
Practical
Tests
Complete packet questions
Complete questions

Resources/Equipment:

Fletcher, G. (2005). Residential Construction Academy: House Wiring, Instructor's Resource Guide, 3rd Edition. Delmar Cengage Learning: Clifton Park: NY. Fletcher, G. (2011). Residential Construction

Academy: House Wiring, Instructor's Resource Guide, 3rd Edition. Delmar Cengage Learning: Clifton Park: NY. National Center for Construction Education and Research (NCCER). (2000). Core Curriculum, Annotated Instructor's Guide. Upper Saddle River, NJ: Prentice Hall. NCCER. (2003). Residential Electrical I, Annotated Instructor's Guide. Upper Saddle River, NJ: Prentice Hall. Module: equipment in electrical trade National Electrical Code Book Version 2011 Measuring and drawing tools House Project Floor Structure and blueprints Student Notebook Smart Board Blueprint paperHyperlinks: https://www.youtube.com/watch?v=SKGkP5E6Ke0

Monroe Career & Technical Institute

Course: Electrical Technology

Unit Name: 500 ANCHORS AND SUPPORTS
Number: 500 **Hours:** 5.00
Dates: Spring 2025

Description/Objectives:

Student will know and be able to identify and install various types of anchors and supports.

Tasks:

PA501 - Identify, select and install various types of anchors and supports.

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:

Read Chapter

Complete assigned questions

View demonstration video and take notes

Identify different types of anchors and supports

Participate in theory lesson, take notes, and respond to questions
Review safety standards
Complete Term Sheet
Complete Assignment Sheet
Complete individual and group projects
Memorize essential vocabulary

Skills:
Install various anchors and supports

Remediation:
Re-teach major concepts
Worksheets
Individual Tutoring
Peer Tutoring
Study Guides

Enrichment:
Begin next task when the previous task is satisfactorily completed
Complete a safety review of the program
Assist another student

Safety:

Student must:
Handle material in a safe and work like manner
Use protective clothing and equipment
Use hand tools in a safe manner
Use adequate ventilation when working in enclosed area
Follow manufacturer’s directions when using any product, tool, equipment, etc.
Use proper safety precautions when using /operating hand tools
Use tools and equipment in a professional work like manner according to OSHA standards
Know and follow the established safety rules at all times
Wear work boots with thick cleats
Wear blue jeans & Electrical Technology tee-shirt (all cotton)
Review “Safety Factor” notes before beginning work
Wear safety glasses at all times while working
Check that work station disconnect is in the off position
Any tool not in your hand is to be in your tool pouch
Follow manufacturer's directions when using any product, tool, equipment, etc.
Use proper safety precautions when using / operating hand tools

Assessment:

Rubrics
Quizzes
Worksheets
Project
Practical
Tests
Complete packet questions
Complete questions

Resources/Equipment:

Fletcher, G. (2005). Residential Construction Academy: House Wiring, Instructor's Resource Guide, 3rd Edition. Delmar Cengage Learning: Clifton Park: NY. Fletcher, G. (2011). Residential Construction Academy: House Wiring, Instructor's Resource Guide, 3rd Edition. Delmar Cengage Learning: Clifton Park: NY. National Center for Construction Education and Research (NCCER). (2000). Core Curriculum, Annotated Instructor's Guide. Upper Saddle River, NJ: Prentice Hall. NCCER. (2003). Residential Electrical

I, Annotated Instructor's Guide. Upper Saddle River, NJ: Prentice Hall. Various types of anchors and supportsHyperlinks: https://www.youtube.com/watch?v=DQx5SVj0biA

https://www.youtube.com/watch?v=3JI_9ggbmcY

Monroe Career & Technical Institute

Course: Electrical Technology

Unit Name: 600 RESIDENTIAL CABLING TECHNOLOGY
Number: 600 **Hours:** 69.00
Dates: Spring 2025

Description/Objectives:

Student will know and be able to prepare NM cable for connection to devices in accordance with NEC standards and install several types of circuits and rough wiring in a residence and finish wiring.

Tasks:

PA601 - Install non-metallic (NM) Cable.

PA602 - Install metal-clad cable (MC).

PA605 - Terminate a coaxial cable.

PA609 - Identify telecommunications cable types.

PA610 - Terminate a RJ45 connector.

PA611 - Install SE cable.

PA612 - Terminate and splice conductors.

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:
Read the assignment, “Electrical Circuit Components”, in the Residential Packet
Complete assigned questions in the packet, using the reading material as a source
Study the glossary terms contained in this packet
Participate in theory lesson, take notes, and respond to questions
Complete Term Sheet
Complete Assignment Sheet
Complete individual and group projects
Memorize essential vocabulary
Complete peer review with rubric
Complete self review with rubric
Read Chapter
View demonstration video “Installation of a Telephone Circuit” and take notes
View demonstration video and take notes
Use power tools to install:
Telephone circuit
Television circuit
Metal-clad cable (MC)
Install: a timer switched circuit
Category 5 cabling
List several common terms and definitions used in video, voice, and data cable installations
List several general requirements that apply to wiring methods, conductors, and electrical boxes installed during the rough-in stage of a residential wiring system

Skill:
Demonstrate the proper preparation of NM Cable for connection to devices
Demonstrate an understanding of the proper way to terminate circuit conductors to a switch or receptacle device
Select the proper receptacle for a specific residential application
Demonstrate an understanding of the proper installation techniques for receptacles
Select the proper switch type for a specific residential application
Demonstrate an understanding of the proper installation techniques for switches
Demonstrate an understanding of GFCI receptacle installation
Demonstrate an understanding of AFCI receptacle installation
Demonstrate an understanding of TVSS receptacle installation
Demonstration an understanding of EIA/TIA 570-B standards for the installation of video, voice, and data wiring in residential
Identify common materials and equipment used in video, voice, and data wiring
Demonstrate an understanding of the installation of video, voice, and data wiring in residential applications
Install crimp-on and compression style f-Type coaxial cable connectors
Install RJ-45 jacks and plugs on Category 5e and Category 6 unshielded twisted pair cable
Discuss the selection of appropriate wiring methods, conductor types, and electrical boxes for a residential electrical system rough-in
Demonstrate an understanding of general requirements for wiring as they apply to residential rough-in wiring
Demonstrate an understanding of general requirements for conductors as they apply to residential rough-in wiring
Demonstrate an understanding of general requirements for electrical box installation as they apply to residential rough-in wiring
Demonstrate an understanding of the installation of general lighting
Demonstrate an understanding of the installation of electric range
Demonstrate an understanding of the installation of counter top cook unit and wall-mounted oven
Demonstrate an understanding of the installation of garbage disposal
Demonstrate an understanding of the installation of dishwasher
Demonstrate an understanding of the installation of electric clothes dryer
Demonstrate an understanding of the installation of a water pump
Demonstrate an understanding of the installation of electric water heater
Demonstrate an understanding of the installation of heating and air conditioning
Demonstrate an understanding of the installation of electric heating

Remediation:
Re-teach major concepts
Worksheets
Individual Tutoring
Peer Tutoring
Study Guides

Enrichment:
Begin next task when the previous task is satisfactorily completed
Complete a safety review of the program
Assist another student

Safety:

Student must:
Handle material in a safe and work like manner
Use protective clothing and equipment
Use hand tools in a safe manner
Use adequate ventilation when working in enclosed area
Follow manufacturer’s directions when using any product, tool, equipment, etc.
Use proper safety precautions when using /operating hand tools
Use tools and equipment in a professional work like manner according to OSHA standards
Know and follow the established safety rules at all times
Wear work boots with thick cleats
Wear blue jeans & Electrical Technology tee-shirt (all cotton)
Review “Safety Factor” notes before beginning work
Wear safety glasses at all times while working
Check that work station disconnect is in the off position
Any tool not in your hand is to be in your tool pouch
Follow manufacturer's directions when using any product, tool, equipment, etc.
Use proper safety precautions when using / operating hand tools

Assessment:

Complete packet questions
Complete questions
Test
Self Review
Rubric
Practical

Resources/Equipment:

Fletcher, G. (2005). Residential Construction Academy: House Wiring, Instructor's Resource Guide, 3rd Edition. Delmar Cengage Learning: Clifton Park: NY. Fletcher, G. (2011). Residential Construction Academy: House Wiring, Instructor's Resource Guide, 3rd Edition. Delmar Cengage Learning: Clifton Park: NY. National Center for Construction Education and Research (NCCER). (2000). Core Curriculum, Annotated Instructor's Guide. Upper Saddle River, NJ: Prentice Hall. NCCER. (2003). Residential Electrical I, Annotated Instructor's Guide. Upper Saddle River, NJ: Prentice Hall. Module: equipment in electrical trade Learning Activity Packet "NM Cable" Materials for project NEC Book 2011 Workstation Electricians Tool Pouch with assorted tools: lineman's pliers, electrician's knife, T-strippers, etc. Receptacles Non-Metallic Cable Switches GFCI Device AFCI Device TVSS Device Materials for project: anchors telephone wire EMT Sealed-Tight PVC conduit metallic-clad cable category 5 cable Suite Link TrainerHyperlinks: https://www.youtube.com/watch?v=56lfF34_NrA

Monroe Career & Technical Institute

Course: Electrical Technology

Unit Name: 700 SWITCHES AND RECEPTACLES CIRCUITS
Number: 700 **Hours:** 40.00
Dates: Spring 2025

Description/Objectives:

Student will know and be able to install a duplex receptacle, single pole switch,
3-way switch, 4-way switch, a split-wired duplex receptacle and a Ground Fault Circuit Interrupter (GFCI) in accordance with current NEC standards.

Tasks:

PA701 - Install a duplex receptacle.

PA702 - Install a single pole switch.

PA703 - Install a 3-way switch.

PA704 - Install a 4-way switch.

PA705 - Install a split-wired duplex receptacle.

PA706 - Install a Ground Fault Circuit Interrupter (GFCI) receptacle.

PA707 - Install an Arc-Fault Circuit Interrupter (AFCI).

PA708 - Install a time control switch.

PA709 - Install a range receptacle.

PA710 - Install a dryer receptacle.

PA711 - Install various brach circuits.

PA712 - Install connected/smart devices.

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:
Study glossary of terms contained in this packet
View Demonstration Video and take notes
Read NEC Book
Draw wiring diagram of projects
Complete projects
Participate in theory lesson, take notes, and respond to questions
Complete Term Sheet
Complete Assignment Sheet
Complete individual and group projects
Memorize essential vocabulary
Identify common box and enclosure types used in residential wiring.
Identify common box covers and raised rings used in residential wiring.
Identify common conductor and cable types used in residential wiring.
Identify types of cable connectors, conductors, terminals, and lugs.
Identify common raceway types used in residential wiring.
Identify common devices used in residential wiring.
Identify common types of fuses and circuit breakers used in residential wiring.
Describe the operation of a fuse and a circuit breaker.
Identify common panelboards, loadcenters, and safety switches used in residential wiring.
Identify common types of fasteners, fittings, and supports used in residential wiring.

Skill:
Select appropriate switch type for a specific residential switching situation
Select a switch with the proper rating for a specific switching application
List several NEC requirements that apply to switches
Demonstrate an understanding of the proper installation techniques for single-pole, three-way, and four-way switches
Demonstrate an understanding of the proper installation techniques for switched duplex receptacle, combination switches, and double-pole switches
Demonstrate an understanding of the proper installation techniques for single-pole and three-way dimmer switches
Demonstrate an understanding of the proper installation techniques of ceiling-suspended paddle fan/light switches
List several nationally recognized testing laboratories and demonstrate an understanding of the purpose of these labs.

Remediation:
Re-teach major concepts
Worksheets
Individual Tutoring
Peer Tutoring
Study Guides

Enrichment:

Begin next task when the previous task is satisfactorily completed
Complete a safety review of the program
Assist another student

Safety:

Student must:
Handle material in a safe and work like manner
Use protective clothing and equipment
Use hand tools in a safe manner
Use adequate ventilation when working in enclosed area
Follow manufacturer’s directions when using any product, tool, equipment, etc.
Use proper safety precautions when using /operating hand tools
Use tools and equipment in a professional work like manner according to OSHA standards
Know and follow the established safety rules at all times
Wear work boots with thick cleats
Wear blue jeans & Electrical Technology tee-shirt (all cotton)
Review “Safety Factor” notes before beginning work
Wear safety glasses at all times while working
Check that work station disconnect is in the off position
Any tool not in your hand is to be in your tool pouch
Follow manufacturer's directions when using any product, tool, equipment, etc.
Use proper safety precautions when using / operating hand tools

Assessment:

Rubrics
Quizzes
Worksheets
Project
Practical
Tests
Complete packet questions
Complete questions

Resources/Equipment:

Fletcher, G. (2005). Residential Construction Academy: House Wiring, Instructor's Resource Guide, 3rd Edition. Delmar Cengage Learning: Clifton Park: NY. Fletcher, G. (2011). Residential Construction Academy: House Wiring, Instructor's Resource Guide, 3rd Edition. Delmar Cengage Learning: Clifton Park: NY. National Center for Construction Education and Research (NCCER). (2000). Core Curriculum, Annotated Instructor's Guide. Upper Saddle River, NJ: Prentice Hall. NCCER. (2003). Residential Electrical I, Annotated Instructor's Guide. Upper Saddle River, NJ: Prentice Hall. Module: equipment in electrical trade Single pole Three-way and four-way switches Non-Metallic Sheathed Cable Receptacles NEC Book Version 2011 Workstation/Booth area Fire Extinguisher Electricians Tool Pouch with assorted tools: lineman's pliers, electrician's knife, T-strippers, etc. Various types of switchesHyperlinks: https://www.youtube.com/watch?v=jF8QOF_IPNA

Monroe Career & Technical Institute

Course: Electrical Technology

Unit Name: 800 FIXTURES
Number: 800 **Hours:** 20.00
Dates: Spring 2025

Description/Objectives:

Student will know and be able to install a surface-mounted light fixture and recessed light fixture in accordance with the NEC standards.

Tasks:

PA801 - Install surface-mounted lighting fixture.

PA802 - Install recessed lighting fixtures.

PA803 - Install a ceiling fan.

PA804 - Install special purpose lighting.

PA805 - Identify IC and non-IC recessed lighting fixtures.

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

Instructional Activities:

Knowledge:
View demonstration video and take notes
Draw wiring diagram of projects
Read textbook
Participate in theory lesson, take notes, and respond to questions
Complete Term Sheet
Complete Assignment Sheet
Complete individual and group projects
Memorize essential vocabulary

Skill:
Demonstrate an understanding of lighting basic
Demonstrate an understanding of common lamp and lighting fixture terminology
Demonstrate an understanding of the four different lamp types used in residential wiring applications: incandescent, LED, florescent, and high-intensity discharge
Select a lighting fixture for a specific residential living area
Demonstrate an understanding of the installation of common residential lighting fixtures
Demonstrate an understanding of the installation of ceiling-suspended paddle fans

Remediation:
Re-teach major concepts
Worksheets
Individual Tutoring
Peer Tutoring
Study Guides

Enrichment:
Begin next task when the previous task is satisfactorily completed
Complete a safety review of the program
Assist another student

Safety:

Student must:
Handle material in a safe and work like manner
Use protective clothing and equipment
Use hand tools in a safe manner
Use adequate ventilation when working in enclosed area
Follow manufacturer’s directions when using any product, tool, equipment, etc.
Use proper safety precautions when using /operating hand tools
Use tools and equipment in a professional work like manner according to OSHA standards
Know and follow the established safety rules at all times
Wear work boots with thick cleats

Wear blue jeans & Electrical Technology tee-shirt (all cotton)
Review “Safety Factor” notes before beginning work
Wear safety glasses at all times while working
Check that work station disconnect is in the off position
Any tool not in your hand is to be in your tool pouch
Follow manufacturer's directions when using any product, tool, equipment, etc.
Use proper safety precautions when using / operating hand tools

Assessment:

Rubrics
Quizzes
Worksheets
Project
Practicals
Tests
Complete packet questions
Complete questions

Resources/Equipment:

Fletcher, G. (2005). Residential Construction Academy: House Wiring, Instructor's Resource Guide, 3rd Edition. Delmar Cengage Learning: Clifton Park: NY. Fletcher, G. (2011). Residential Construction Academy: House Wiring, Instructor's Resource Guide, 3rd Edition. Delmar Cengage Learning: Clifton Park: NY. National Center for Construction Education and Research (NCCER). (2000). Core Curriculum, Annotated Instructor's Guide. Upper Saddle River, NJ: Prentice Hall. NCCER. (2003). Residential Electrical I, Annotated Instructor's Guide. Upper Saddle River, NJ: Prentice Hall.Module: equipment in electrical trade Electrician’s Tool Pouch and Standard Tools Electrical Wiring Residential Packet Materials for project: Surface mounted light fixture, recessed light fixture, non-metallic cable, staples, breaker NEC Book Version 2011 Workstation/Booth areaHyperlinks: https://www.youtube.com/watch?v=amB6wSn5LlQ

Monroe Career & Technical Institute

Course: Electrical Technology

Unit Name: 900 RACEWAYS
Number: 900 **Hours:** 46.00
Dates: Spring 2025

Description/Objectives:

Student will know and be able to install circuits including circuits in a variety of raceways dependent upon weather conditions and installation requirements.

Tasks:

PA901 - Install Electrical Metallic Tubing (EMT).

PA903 - Design a surface raceway system (wiremold).

PA904 - Install flexible raceway.

PA908 - Bend a stub 90°.

PA909 - Bend an offset.

PA910 - Bend a back to back 90°.

PA911 - Cut, ream and deburr raceway systems.

PA912 - Install conductors in a raceway 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.
  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:
Read Chapter
Complete assigned questions
View demonstration video and take notes
Install various anchors and supports
Use power tools to install:
Electrical Metallic Tubing (EMT)
Poly-Vinyl Chloride conduit (PVC)
Surface metal and non-metal raceways (Wiremold)
Liquid-tight flexible metal conduit (Seal-Tite)
Metal-clad cable (MC)
Participate in theory lesson, take notes, and respond to questions
Review safety standards
Complete Term Sheet
Complete Assignment Sheet
Complete individual and group projects
Memorize essential vocabulary

Skill:
Select an appropriate raceway size and type for a residential application
Demonstrate an understanding of the proper techniques for cutting, threading, and bending electrical conduit for residential applications
Demonstrate an understanding of the proper installation techniques for common raceway types used in residential wiring
Demonstrate an understanding of the common installation techniques for installing conductors in an installed raceway system
Identify the methods of hand bending conduit
Identify the various methods used to install conduit
Use math formulas to determine conduit bends
Make 90 degree bends, back-to-back bends, offsets, kicks, and saddle bends using a hand bender
Cut, ream,and thread conduit

Remediation:
Re-teach major concepts
Worksheets
Individual Tutoring
Peer Tutoring
Study Guides

Enrichment:
Begin next task when the previous task is satisfactorily completed
Complete a safety review of the program
Assist another student

Safety:

Student must:
Handle material in a safe and work like manner
Use protective clothing and equipment
Use hand tools in a safe manner
Use adequate ventilation when working in enclosed area
Follow manufacturer’s directions when using any product, tool, equipment, etc.
Use proper safety precautions when using /operating hand tools
Use tools and equipment in a professional work like manner according to OSHA standards
Know and follow the established safety rules at all times

Wear work boots with thick cleats
Wear blue jeans & Electrical Technology tee-shirt (all cotton)
Review “Safety Factor” notes before beginning work
Wear safety glasses at all times while working
Check that work station disconnect is in the off position
Any tool not in your hand is to be in your tool pouch
Follow manufacturer's directions when using any product, tool, equipment, etc.
Use proper safety precautions when using / operating hand tools

Assessment:

Rubrics
Quizzes
Worksheets
Project
Practicals
Tests
Complete packet questions
Complete questions

Resources/Equipment:

Fletcher, G. (2005). Residential Construction Academy: House Wiring, Instructor's Resource Guide, 3rd Edition. Delmar Cengage Learning: Clifton Park: NY. Fletcher, G. (2011). Residential Construction Academy: House Wiring, Instructor's Resource Guide, 3rd Edition. Delmar Cengage Learning: Clifton Park: NY. National Center for Construction Education and Research (NCCER). (2000). Core Curriculum, Annotated Instructor's Guide. Upper Saddle River, NJ: Prentice Hall. NCCER. (2003). Residential Electrical I, Annotated Instructor's Guide. Upper Saddle River, NJ: Prentice Hall.Module: equipment in electrical trade Materials for project: anchors EMT Sealed-Tight PVC conduit National Electrical Code Book Version 2011 Workstation Demonstration Video Student Notebook Cable Wire Sweet Link Trainer Rope Conduit cutter, threader and reamer PVC Hotbox HacksawHyperlinks: https://www.youtube.com/watch?v=A0cXKa4Y3do

Monroe Career & Technical Institute

Course: Electrical Technology

Unit Name: 1000 WIRED DEVICES
Number: 1000 **Hours:** 10.00
Dates: Spring 2025

Description/Objectives:

Student will know and be able to install a hard wired smoke detector and door-bell system according to NEC Standards.

Tasks:

PA1001 - Install a hard-wired smoke detector.

PA1002 - Install door-bell system.

PA1003 - Trim out electrical devices.

PA1004 - Install an occupancy sensor.

PA1005 - Install a photocell.

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.
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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.
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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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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

Instructional Activities:

Knowledge:
Complete Reading assignment
Complete review questions
Participate in theory lesson, take notes, and respond to questions
Complete Term Sheet
Complete Assignment Sheet
Complete individual and group projects
Memorize essential vocabulary

Skill:
Demonstrate an understanding of the installation of of a branch circuit for smoke detectors
Demonstrate an understanding of the installation of a branch circuit for carbon monoxide detectors

Demonstrate an understanding of the installation of a low-voltage chime circuit

Remediation:
Re-teach major concepts
Worksheets
Individual Tutoring
Peer Tutoring
Study Guides

Enrichment:
Begin next task when the previous task is satisfactorily completed
Complete a safety review of the program
Assist another student

Safety:

Student must:
Handle material in a safe and work like manner
Use protective clothing and equipment
Use hand tools in a safe manner
Use adequate ventilation when working in enclosed area
Follow manufacturer’s directions when using any product, tool, equipment, etc.
Use proper safety precautions when using /operating hand tools
Use tools and equipment in a professional work like manner according to OSHA standards
Know and follow the established safety rules at all times
Wear work boots with thick cleats
Wear blue jeans & Electrical Technology tee-shirt (all cotton)
Review “Safety Factor” notes before beginning work
Wear safety glasses at all times while working
Check that work station disconnect is in the off position
Any tool not in your hand is to be in your tool pouch
Follow manufacturer's directions when using any product, tool, equipment, etc.
Use proper safety precautions when using / operating hand tools

Assessment:

Rubrics
Quizzes
Worksheets
Project
Practicals
Tests
Complete packet questions
Complete questions

Resources/Equipment:

Fletcher, G. (2005). Residential Construction Academy: House Wiring, Instructor's Resource Guide, 3rd Edition. Delmar Cengage Learning: Clifton Park: NY. Fletcher, G. (2011). Residential Construction Academy: House Wiring, Instructor's Resource Guide, 3rd Edition. Delmar Cengage Learning: Clifton Park: NY. National Center for Construction Education and Research (NCCER). (2000). Core Curriculum, Annotated Instructor's Guide. Upper Saddle River, NJ: Prentice Hall. NCCER. (2003). Residential Electrical I, Annotated Instructor's Guide. Upper Saddle River, NJ: Prentice Hall.Module: equipment in electrical trade National Electrical Code Book Version 2011 Electricians Tool Pouch with assorted tools: lineman's pliers, electrician's knife, T-strippers, etc. Smoke Detectors Door Bell KitHyperlinks: https://www.youtube.com/watch?v=m6Ejw195C0E

Monroe Career & Technical Institute

Course: Electrical Technology

Unit Name: 1100 TESTING EQUIPMENT
Number: 1100 **Hours:** 60.00
Dates: Spring 2025

Description/Objectives:

Student will know and be able to use a multimeter, a continuity tester, a plug-in circuit tester and a clamp-on ammeter.

Tasks:

PA1101 - Use a multimeter to test a circuit.

PA1103 - Use a plug-in circuit tester.

PA1104 - Use a clamp-on ammeter.

PA1106 - Use a circuit tracer.

PA1107 - Use a network cable tester.

PA1108 - Apply Ohm's/Watt's law calculations to electrical applications.

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.
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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).
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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.
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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.
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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.
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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

Instructional Activities:

Knowledge:
View demonstration video “Electrical Meters” and take notes
Participate in theory lesson, take notes, and respond to questions
Complete Term Sheet
Complete Assignment Sheet
Complete individual and group projects
Memorize essential vocabulary

Skill:
Demonstrate the ability to use a multimeter to measure voltage, current, and resistance

Demonstrate an understanding of continuity testes and how to properly use them
Demonstrate and understanding of the differences between a voltage tester and voltmeter
Connect and properly use a voltage tester and a voltmeter
Demonstrate an understanding of the differences between an in-line ammeter and a clamp-on anmeter
Connect and properly use a clamp-on meter
Demonstrate an understanding of ohmmeters, megohmmeters, and ground resistance meters
Demonstrate an understanding of multimeters
Connect and properly use a mulitmeter to test for voltage, current, resistance, and continuity
Demonstrate an understanding of the uses of a try RMS meter
Demonstrate an understanding of how to read a kilowatt-hour meter
Demonstrate an understanding of safe practices to follow when using test and measurement instruments
Demonstrate an understanding of the proper care and maintenance of test and measurement instruments

Remediation:
Re-teach major concepts
Worksheets
Individual Tutoring
Peer Tutoring
Study Guides

Enrichment:
Begin next task when the previous task is satisfactorily completed
Complete a safety review of the program
Assist another student

Safety:

Student must:
Handle material in a safe and work like manner
Use protective clothing and equipment
Use hand tools in a safe manner
Use adequate ventilation when working in enclosed area
Follow manufacturer’s directions when using any product, tool, equipment, etc.
Use proper safety precautions when using /operating hand tools
Use tools and equipment in a professional work like manner according to OSHA standards
Know and follow the established safety rules at all times
Wear work boots with thick cleats
Wear blue jeans & Electrical Technology tee-shirt (all cotton)
Review “Safety Factor” notes before beginning work
Wear safety glasses at all times while working
Check that work station disconnect is in the off position
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Assessment:

Rubrics
Quizzes
Worksheets
Project
Practicals
Tests
Complete packet questions
Complete questions

Resources/Equipment:

Fletcher, G. (2005). Residential Construction Academy: House Wiring, Instructor's Resource Guide, 3rd Edition. Delmar Cengage Learning: Clifton Park: NY. Fletcher, G. (2011). Residential Construction

Academy: House Wiring, Instructor's Resource Guide, 3rd Edition. Delmar Cengage Learning: Clifton Park: NY. National Center for Construction Education and Research (NCCER). (2000). Core Curriculum, Annotated Instructor's Guide. Upper Saddle River, NJ: Prentice Hall. NCCER. (2003). Residential Electrical I, Annotated Instructor's Guide. Upper Saddle River, NJ: Prentice Hall.Module: equipment in electrical trade Multimeter Materials for project: clamp on meter, multi-meter, plug-in tester, continuity meter Demonstration Video (Analog & Digital Testing Equipment) Diode Electric Jack Hammer Resistor Single Pole Switch Live CircuitHyperlinks: https://www.youtube.com/watch?v=zr4Ow1JT9jU

Monroe Career & Technical Institute

Course: Electrical Technology

Unit Name: 1200 ELECTRICAL SERVICE
Number: 1200 **Hours:** 120.00
Dates: Spring 2025

Description/Objectives:

Student will know and be able to install a 100 amp overhead and underground service safely according to NEC Standards.

Tasks:

PA1201 - Install an overhead service.

PA1202 - Identify parts of an underground service.

PA1209 - Identify types of safety disconnect switches.

PA1210 - Terminate a service panel/load center/sub-panel.

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.
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  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

Instructional Activities:

Knowledge:
Read Chapter
Participate in theory lesson, take notes, and respond to questions
Complete Term Sheet
Complete Assignment Sheet
Complete individual and group projects
Memorize essential vocabulary

Skill:
Demonstrate an understanding of an overhead and an underground residential service entrance
Define common residential service entrance terms
Demonstrate and understanding of NEC requirements for residential service
Demonstrate an understanding of grounding and bonding requirements for residential service entrances
List several NEC requirements that apply to residential service entrances
Demonstrate an understanding of common electric utility company requirements
Demonstrate an understanding of how to establish temporary and permanent power with an electric utility company
Identify common overhead service entrance equipment and materials
Identify common underground service entrance equipment and materials
Demonstrate an understanding of common installation techniques for overhead services
Demonstrate an understanding of common installation techniques for underground services
Demonstrate an understanding of voltage drop in underground service laterals
Demonstrate an understanding of service panel installation techniques
Demonstrate an understanding of subpanel installation techniques
Demonstrate an understanding of service entrance upgrade techniques

Remediation:
Re-teach major concepts
Worksheets
Individual Tutoring
Peer Tutoring
Study Guides

Enrichment:
Begin next task when the previous task is satisfactorily completed
Complete a safety review of the program
Assist another student

Safety:

Student must:
Handle material in a safe and work like manner
Use protective clothing and equipment
Use hand tools in a safe manner
Use adequate ventilation when working in enclosed area
Follow manufacturer’s directions when using any product, tool, equipment, etc.
Use proper safety precautions when using /operating hand tools
Use tools and equipment in a professional work like manner according to OSHA standards
Know and follow the established safety rules at all times
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Assessment:

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Quizzes
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Complete packet questions
Complete questions

Resources/Equipment:

Fletcher, G. (2005). Residential Construction Academy: House Wiring, Instructor's Resource Guide, 3rd Edition. Delmar Cengage Learning: Clifton Park: NY. Fletcher, G. (2011). Residential Construction Academy: House Wiring, Instructor's Resource Guide, 3rd Edition. Delmar Cengage Learning: Clifton Park: NY. National Center for Construction Education and Research (NCCER). (2000). Core Curriculum, Annotated Instructor's Guide. Upper Saddle River, NJ: Prentice Hall. NCCER. (2003). Residential Electrical I, Annotated Instructor's Guide. Upper Saddle River, NJ: Prentice Hall.Module: equipment in electrical trade Ladders Scaffold 100 amp Service Kit 200 amp Service Kit Electricians Tool Pouch with assorted tools: lineman's pliers, electrician's knife, T-strippers, etc. NEC Book Version 2011 Workstation/Booth area 2 1/2" galvanized pipe Flashing Kit 3" Expansion Coupler 4/0 SEU Cable 4/0 URD Cable #2 SEU Cable Ground rod 2" PVC Pipe 2" PVC LBHyperlinks: https://www.youtube.com/watch?v=V_XXb892pqk

Monroe Career & Technical Institute

Course: Electrical Technology

Unit Name: 1400 GREEN TECHNOLOGY
Number: 1400 **Hours:** 130.00
Dates: Spring 2025

Description/Objectives:

Student will know and be able to identify renewable energy resources and safely use energy saving devices.

Tasks:

PA1401 - Identify renewable energy sources.

PA1402 - Identify procedures for installing a wind turbine system.

PA1404 - Identify procedures for installing a solar energy system.

PA1407 - Evaluate the demand and consumption of electrical energy.

Standards / Assessment Anchors
Focus Anchor/Standard #1:

- Science, Technology & Engineering, and Environmental Literacy & Sustainability Standards
  3.5.9-12.2 Strand: Applying, Maintaining, and Assessing Technological Products and Systems

  Supporting Anchor/Standards:

  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.H Evaluate ways that technology and engineering can impact individuals, society, and the environment.
  3.5.9-12.I (ETS) Evaluate a solution to a complex real-world problem based on prioritized criteria and tradeoffs that account for a range of constraints, including cost, safety, reliability, and aesthetics as well as possible social, cultural, and environmental impacts.
  3.5.9-12.J Synthesize data and analyze trends to make decisions about technological products, systems, or processes.

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:
View demonstration video and take notes
Draw wiring diagram of projects
Read textbook
Participate in theory lesson, take notes, and respond to questions
Complete Term Sheet
Complete Assignment Sheet
Complete individual and group projects
Memorize essential vocabulary

Skill:
Demonstrate an understanding of how to advise a house building team about energy efficient wiring practices
Demonstrate an understanding of how to advise a building team about durability and water management when installing the electrical system
Demonstrate an understanding of how to advise a building team about selecting green products whenever they are available
Demonstrate an understanding of how to advise a building team about reducing material use and waste when intalling the house electrical system
Demonstrate an understanding of how to advise a building team about what electrical system items to include in a home owner education and reference manual
Demonstrate an understanding of the different types of photovoltaic systems used in residential wiring
Demonstrate an understanding of the components that make-up a photovoltaic system installation

List the system components that make up a typical stand-alone PV system
List the system components that make up a typical interactive (grid-tie) PV system
Demonstrate an understanding of how a typical photovoltaic system is installed
List several NEC requirements that apply to photovoltaic system installation
Demonstrate an understanding of small wind turbine system installation
List the components that make up a small wind turbine system
List several NEC requirements that apply to a small wind turbine system installation

Remediation:
Re-teach major concepts
Worksheets
Individual Tutoring
Peer Tutoring
Study Guides

Enrichment:
Begin next task when the previous task is satisfactorily completed
Complete a safety review of the program
Assist another student

Safety:

Student must:
Handle material in a safe and work like manner
Use protective clothing and equipment
Use hand tools in a safe manner
Use adequate ventilation when working in enclosed area
Follow manufacturer’s directions when using any product, tool, equipment, etc.
Use proper safety precautions when using /operating hand tools
Use tools and equipment in a professional work like manner according to OSHA standards
Know and follow the established safety rules at all times
Wear work boots with thick cleats
Wear blue jeans & Electrical Technology tee-shirt (all cotton)
Review “Safety Factor” notes before beginning work
Wear safety glasses at all times while working
Check that work station disconnect is in the off position
Any tool not in your hand is to be in your tool pouch
Follow manufacturer's directions when using any product, tool, equipment, etc.
Use proper safety precautions when using / operating hand tools

Assessment:

Rubrics
Quizzes
Worksheets
Project
Practicals
Tests
Complete packet questions
Complete questions

Resources/Equipment:

Fletcher, G. (2005). Residential Construction Academy: House Wiring, Instructor's Resource Guide, 3rd Edition. Delmar Cengage Learning: Clifton Park: NY. Fletcher, G. (2011). Residential Construction Academy: House Wiring, Instructor's Resource Guide, 3rd Edition. Delmar Cengage Learning: Clifton Park: NY. National Center for Construction Education and Research (NCCER). (2000). Core Curriculum, Annotated Instructor's Guide. Upper Saddle River, NJ: Prentice Hall. NCCER. (2003). Residential Electrical I, Annotated Instructor's Guide. Upper Saddle River, NJ: Prentice Hall. National Electrical Code Book

Version 2011 Electricians Tool Pouch with assorted tools: lineman's pliers, electrician's knife, T-strippers, etc. Wind and solar trainerHyperlinks: https://www.youtube.com/watch?v=subiaaXBoDI