



LAWRENCE COUNTY CAREER AND TECHNICAL CENTER

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Intermediate Electrical occupations

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- Determining Branch Circuit, Feeder Circuit, Service Entrance Requirements
- General Requirements for Rough-In Wiring
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- Cable Installation
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UbD Curriculum Overview

Department	Electrical Occupations		
Course Name	Intermediate Electrical Occupations		
Course Summary	Electrical Occupations is a program which prepares students for electrical careers in both industry and construction. Electrical wiring systems in houses and commercial buildings are assembled, installed, and maintained by electricians. Electricians generally specialize in either construction or industrial maintenance although some do both. Construction electricians layout, assemble, install, and test electrical fixtures and wiring used in the electrical systems of construction sites. Maintenance electricians maintain and keep many different types of electrical equipment in good working order principally by detecting and repairing defective equipment before a breakdown occurs.		
Unit Name	Residential Workplace Safety		
Grade Level(s)	11		2 Weeks
Created (Date)	12/23/21		

Standards Addressed

List all standards that will be addressed during the unit.

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



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- 108 Perform lockout/tagout.
- 109 Inspect and use ladders
- 110 Complete jobsite hazard analysis form
- 111 Identify Arc-flash hazards and protection

Stage 1 - Desired Results: Enduring Understandings & Essential Questions

What are the overarching takeaways and big ideas for students?

Big Ideas	1. Understanding Electrical Hazards, Electrical Shock, Arc Flash, and Arc Blast
Transfer	<i>Students will be able to independently use their learning to...</i> •
Meaning	<i>Students will understand that...</i> • There are three general categories of electrical hazards that a residential electrician could be exposed to. They are electrical shock, arc-flash, and arc-blast. It is very important for an electrician to understand these hazards and learn how to avoid them.
Essential Questions	1. In a work situation where an electrician's hands get wet while operating a 120-volt, corded drill what happens to the body's resistance? 2. What is the amount of current that it takes to cause ventricular fibrillation ? 3. What is considered an insulator? 4. What is the definition of electrical shock? 5. What is an arc flash? 6. What is an arc blast? 7. What is the purpose of a ground fault circuit interrupter? 8. What does the equipment grounding conductor provide?

Stage 1 - Essential Content, Concepts, & Skills

What do we want students to know and be able to do?

Acquisition

Knowledge	<i>Students will know...</i> • Different types of electrical hazards, (electrical shock, arc flash, arc blast) • The uses of Ground fault Circuit Interrupters • The importance electrical grounding
Skills	<i>Students will be skilled at (be able to do)...</i> • Demonstrate an understanding of the electrical hazards associated with electrical work.



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- 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.
- List several safety practices pertaining to general and electrical safety.
- Understand the importance of electrical grounding.
- Understand the importance of the use of ground fault circuit interrupters

Stage 2 - Assessments / Evidence of Learning

What are the formative (informal) and summative (formal) assessments used to measure learning and growth? How will you know that they did it?

Evaluation Criteria (F/S)	Assessment Evidence
Formative Evaluation • Chapter 1 Workbook Troubleshooting-Quality Exercises (Practice) Summative Evaluation • Chapter 1 Review Questions • Chapter1 practice quiz • Chapter 1 quiz • Chapter 1 Test	Performance Task(s) / Think: • Identify common electrical hazards and how to avoid them on the job. • Demonstrate an understanding of the purpose of OSHA. • List several safety practices pertaining to general and electrical safety. • Demonstrate the importance of grounding • Install a Ground fault circuit interrupter receptacle
	Other Evidence: • Correctly answer troubleshooting lab exercise 1

Stage 3 - Learning Plan

What are the differentiated instructional strategies, activities, lesson plans that support the enduring understandings and essential questions for all students? This section provides a summary of the Key Learning Events and Instruction.

Summary of Key Learning Events and Instruction

Chapter 1 Outline

Objective 1-1:

- Demonstrate an understanding of the electrical hazards associated with electrical work.

Key terms: voltage, conductor, insulator, circuit, power source, load, current, resistance, Ohm's law, amperes, volts, ohms, arc, arc blast, arc flash

- Electrical shock is considered the biggest safety hazard when doing electrical work.



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- According to the U.S. Bureau of Labor Statistics, there were almost 2,000 workers killed during the 10-year period of 2005 to 2015 from electrical shock.
- Electricity is the flow of electrons through a material.
- The force that causes electrons to move is called voltage. It is measured in volts.
- The amount of electron flow is called current. It is measured in amperes.
- The opposition to electron flow in a material is called resistance. It is measured in ohms.
- Ohm's law is a mathematical representation of the relationship between voltage, current, and resistance in an electrical circuit.
- Assuming that voltage stays the same, less resistance means more current flow; more resistance means less current flow.
- The human body reacts differently to the amount of current flowing through it.
- The longer a person's body is part of an electrical circuit, the greater will be the severity of the injury.
- Burns and arc blasts caused by electricity are other electrical hazards encountered by electricians.
- An arc-flash is a dangerous condition associated with the possible release of energy caused by an electric arc.
- Proper personal protective equipment must be used where the possibility of arcing exists.

Objective 1-2:

- Demonstrate an understanding of the purpose of the National Electrical Code®.

Key term: National Electrical Code® (NEC®)

- The NEC® is the guide for safe wiring practices in the electrical field.
- Every three years the NEC® is brought up to date to reflect the latest changes and trends in the electrical industry.
- The NEC® contains specific rules to help safeguard people and property from the hazards arising from the use of electricity.

Objective 1-3:

- Demonstrate an understanding of the arrangement of the National Electrical Code®.
- The NEC® is divided into nine chapters.
- Chapters 1–4 consist of rules that apply generally to all electrical installations.
- Chapters 5, 6, and 7 apply to special occupancies and equipment.
- Chapter 8 contains rules for the installation of wiring for communications systems.
- Chapter 9 consists of tables that contain information such as conduit fill and conductor properties.
- The chapters are broken down into a series of articles.
- Most articles are divided into parts.
- Each rule found in the NEC® is called a section.
- Tables are used throughout the NEC® and contain various amounts and types of information.
- There are a few basic illustrations in the NEC® and they are called figures.
- Exceptions to NEC® rules are listed under the section where they apply and are written in italic text.
- Informational Notes are used to provide explanatory material and are placed after the section or table to which they apply.
- The table of contents lists each article in numerical order.
- Informative Annexes are located after Chapter 9 and contain additional explanatory material that is designed to help people use the NEC®.
- The index is located at the very end of the NEC®. It contains the major topic areas covered in the NEC® and lists them in alphabetical order.



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Objective 1-4:

- Identify examples of rules from the National Electrical Code® that apply to common residential electrical safety hazards.

Key term: ground fault circuit interrupter (GFCI)

- Section 210.8(A) specifies where GFCI protection is required in residential wiring applications.
- GFCI protection for personnel on construction sites must be provided according to Section 590.6.
- Grounding of electrical tools and equipment is one of the most important methods of controlling the hazards of electricity and is covered in Article 250.

Objective 1-5:

- Demonstrate an understanding of the purpose of NFPA 70E Standard for Electrical Safety in the Workplace.

Key term: NFPA 70E

- The purpose of NFPA 70E is to provide a practical safe working area for employees relative to the hazards arising from the use of electricity.
- NFPA 70E addresses electrical safety concerns in all of the places that the NEC® addresses safe installation practices, including residential construction.

Objective 1-6:

- Identify common electrical hazards and how to avoid them on the job.
- Use GFCI-protected cord sets or plug any extension cord you are using into a GFCI-protected receptacle when installing an electrical system.
- Look for conductor insulation that has deteriorated and fix or replace as necessary.
- Make sure that all noncurrent-carrying metal parts of electrical equipment are grounded properly.
- Never use an electrical plug that is missing the grounding prong.

Objective 1-7:

- Demonstrate an understanding of the purpose of OSHA.

Key term: Occupational Safety and Health Administration (OSHA)

- The purpose of OSHA is to ensure safe and healthy working conditions for working men and women on the jobsite by authorizing enforcement of safety standards; to assist and encourage the states in their efforts to ensure safe and healthy working conditions; and to provide for research, information, education, and training in the field of occupational safety and health.
- Code of Federal Regulations (CFR) Title 29, Part 1910 covers regulations for general industry. Regulations on general electrical safety are covered in CFR Title 29, 1910, Subpart S – Electrical.
- Code of Federal Regulations (CFR) Title 29, Part 1926 covers regulations for the construction industry. Electrical safety on the construction site is covered in CFR Title 29, 1926, Subpart K – Electrical.

Objective 1-8:

- Identify examples of specific OSHA requirements that apply to various general and electrical safety hazards associated with residential wiring.
- OSHA 29 CFR 1910.332 requires employees be trained in safety-related work practices.
- An OSHA 10 card should be acquired by any student electrician entering the residential workforce.



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- OSHA 29 CFR 1910.333 and 29 CFR 1926.417 outlines the requirements for lock-out/tag-out procedures for the electrical source of the circuit or equipment you may be working on.
- OSHA 29 CFR Part 1926 and 29 CFR Part 1910.335 requires electricians working where there is a potential electrical or other safety hazard to wear personal protective equipment.
- OSHA 29 CFR 1926.416 requires that existing conditions be determined by inspection or testing with a meter before any work can be started. Always assume an electrical circuit is energized until you verify otherwise by using a proper test instrument.

Objective 1-9:

- Demonstrate an understanding of the personal protective equipment used by residential electricians.

Key terms: hazard, personal protective equipment (PPE)

- Selecting and using the proper PPE is very important.
- PPE is considered to be the last line of defense between you and an injury.
- OSHA requires PPE to be worn. Wearing PPE is not a choice—it is a requirement!
- Safety glasses or face shields must be worn any time a hazard exists that can cause an object to get in your eyes from the front or the sides.
- Head protection (hard hats) must be worn whenever there is a potential for objects to fall from above, bumps to your head from objects fastened in place, or from accidental contact with electrical hazards.
- Wear work shoes or boots with slip-resistant and puncture-proof soles. Safety shoes should be worn to prevent crushed toes when working around heavy equipment or falling objects.
- Wear hand protection (gloves) any time your hands are exposed to a potential hazard.
- Wear hearing protection in high-noise areas.

Objective 1-10:

- List several safety practices pertaining to general and electrical safety.
- General safety rules to follow:
 - Be serious about your work and never fool around on the job.
 - Never use drugs or alcohol on the job.
 - Do not talk unnecessarily when working.
 - Use good judgment in both giving and receiving instructions.
 - Always follow safe practices when handling the materials used to install a residential wiring system.
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Resources

- Residential House Wiring Academy textbook
- National Safety Compliance Videos



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UbD Curriculum Overview

Department	Electrical Occupations		
Course Name	Intermediate Electrical Occupations		
Course Summary	Electrical Occupations is a program which prepares students for electrical careers in both industry and construction. Electrical wiring systems in houses and commercial buildings are assembled, installed, and maintained by electricians. Electricians generally specialize in either construction or industrial maintenance although some do both. Construction electricians layout, assemble, install, and test electrical fixtures and wiring used in the electrical systems of construction sites. Maintenance electricians maintain and keep many different types of electrical equipment in good working order principally by detecting and repairing defective equipment before a breakdown occurs.		
Unit Name	Test and Measurements Instruments used in Residential Wiring - Part 2		
Grade Level(s)	11	Time / Duration	2 Week
Created (Date)	02/15/22	Revised (Date)	9/15/25

Standards Addressed

List all standards that will be addressed during the unit.

- 1101 Use a multimeter to test a circuit.
- 1103 Use a plug-in circuit tester.
- 1104 Use a clamp-on ammeter.
- 1106 Use a circuit tracer.

Stage 1 - Desired Results: Enduring Understandings & Essential Questions
What are the overarching takeaways and big ideas for students?



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Big Ideas	
Transfer	<i>Students will be able to independently use their learning to...</i> • Test and Measure electrical currents , resistance and voltages when troubleshooting a customer's electrical problem.
Meaning	<i>Students will understand that...</i> • Electrical circuits made need to be analyzed with the use of test and measurements instruments when troubleshooting a problem.
Essential Questions	1. A voltage tester may also be considered what type of tester? 2. What is a trade name given to a voltage tester? 3. When checking for a completed circuit what type of tester may be used if the circuit is de-energized? 4. What is considered a short circuit? 5. What type of tester connects to the circuit in parallel? 6. What type of tester is connected in series?

Stage 1 - Essential Content, Concepts, & Skills

What do we want students to know and be able to do?

Acquisition

Knowledge	<i>Students will know...</i> • The ability to use and analyze a circuit with test and measurement instruments are vital skills for a residential electrician.
Skills	<i>Students will be skilled at (be able to do)...</i> • Demonstrate an understanding voltage testers • Demonstrate an understanding of voltage meters • Demonstrate an understanding of a continuity tester • Demonstrate an understanding the differences between an in-line ammeter and a clamp-on ammeter • Demonstrate an understanding of the proper care and maintenance of test and measurement instruments



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Stage 2 - Assessments / Evidence of Learning

What are the formative (informal) and summative (formal) assessments used to measure learning and growth? How will you know that they did it?

Evaluation Criteria (F/S)	Assessment Evidence
- Daily Bell ringer Ch4 Test and measurement instruments used in residential wiring vocabulary (formative) - Powerpoint and lecture on ch 4 Test and Measurement Instruments used in residential wiring (Formative) - Ch4 Test and Measurement Instruments used in residential wiring review questions (Formative) - Ch4 Test and Measurement Instruments used in residential wiring voltage, amperage, resistance and continuity worksheet. (Formative) - Ch4 Test and Measurement Instruments used in residential wiring test (Summative)	Performance Task(s) / Think: - Complete definitions daily for ch4 Test and measurement instruments used in residential wiring - Class discussion with Q&A on Ch4 Test and Measurement Instruments used in residential wiring - Answer Ch4 Test and Measurement Instruments used in residential wiring review questions and discuss missed questions for better understanding - Complete Ch4 Test and Measurement Instruments used in residential wiring worksheet to solve for various voltages , amperes and resistance values - Complete Ch4 Test and Measurement Instruments used in residential wiring test with 70% accuracy.
	Other Evidence: - NOCTI Data - Instructor Observations

Stage 3 - Learning Plan

What are the differentiated instructional strategies, activities, lesson plans that support the enduring understandings and essential questions for all students? This section provides a summary of the Key Learning Events and Instruction.

Summary of Key Learning Events and Instruction

- Day1 Intro to Pos Task list 1100 Testing Instruments
- Day2 Powerpoint presentation and lecture on Ch4 Test and Measurement Instruments used in residential wiring
- Day3 Complete powerpoint presentation and lecture on Ch4 Test and Measurement Instruments used in residential wiring. Open discussion with Q&A. Complete review questions and discuss missed questions.
- Day4 Summary of review questions for Ch4 Test and Measurement Instruments used in residential wiring and quiz
- Day5 Complete Ch4 Test and Measurement Instruments used in residential wiring Test. Complete performance task of testing and measuring voltages, amperages and resistances on a given circuit.



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Resources

- Residential House Wiring Academy
- Mnfg. Instructions

UbD Curriculum Overview

Department	Electrical Occupations
Course Name	Beginner Electrical Occupations



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Course Summary

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Unit Name

Understanding Residential Building Plans

Grade Level(s)

11

Time / Duration

2 Week

Created (Date)

02/15/22

Revised (Date)

10/15/24

Standards Addressed

List all standards that will be addressed during the unit.

- 400 Blueprint Reading
- 401 Identify types of blueprint plans.
- 402 Identify blueprint symbols.
- 403 Interpret blueprint plans.
- 405 Develop electrical details on a blueprint.
- 406 Use a measuring tool to scale.

Stage 1 - Desired Results: Enduring Understandings & Essential Questions

What are the overarching takeaways and big ideas for students?

Big Ideas

1. Blueprints are the building blocks for construction.

Transfer

Students will be able to independently use their learning to...

- Draw and interpret blueprints to accurately install a complete electrical system for a customer.

Meaning

Students will understand that...

- Drawing and interpreting building plans are essential for an electrician to install a complete electrical system.

Essential Questions

1. What is a symbol used for on a blueprint?
2. What is an architect's scale?
3. What is a Title Block?
4. What is meant by the term "Birds eye view"?
5. What are schedules used for on a blueprint?



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Stage 1 - Essential Content, Concepts, & Skills

What do we want students to know and be able to do?

Acquisition

Knowledge

Students will know...

- Blueprints give detailed information about the construction and mechanicals of a home.

Skills

Students will be skilled at (be able to do)...

- Demonstrate an understanding of residential building plans
- Identify common symbols found on residential building plans
- Measure dimensions on a building plan using an architect's scale
- Demonstrate an understanding of basic residential framing methods and components

Stage 2 - Assessments / Evidence of Learning

What are the formative (informal) and summative (formal) assessments used to measure learning and growth? How will you know that they did it?

Evaluation Criteria (F/S)

- Bell ringers Ch5 Understanding residential building plans Vocabulary (Formative)
- Ch 5 Understanding residential building plans review questions (Formative)
- Ch 5 Understanding residential building plans quiz (Formative)
- Ch 5 Understanding residential building plans framing Lab 5.1 worksheet (Formative)
- Ch 5 Understanding residential building plans test (Summative)

Assessment Evidence

Performance Task(s) / Think:

- Define ch 5 Understanding residential building plans vocabulary words daily.
- Answer Understanding residential building plans review question trying to achieve 70% accuracy, Instructor to review all missed questions for better understanding
- Ch 5 Understanding residential building plans quiz (multiple choice)
- Complete Ch5 Understanding residential building plans framing Lab 5.1 Identify parts of framing components
- Answer ch5 Understanding residential building plan test with 70% accuracy

Other Evidence:

- Nocti Data
- Instructor observations



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Stage 3 - Learning Plan

What are the differentiated instructional strategies, activities, lesson plans that support the enduring understandings and essential questions for all students? This section provides a summary of the Key Learning Events and Instruction.

Summary of Key Learning Events and Instruction

- Day1 Intro toCh5 Understanding residential building plans and powerpoint
- Day2 Ch 5 Understanding residential building plans powerpoint continuation and lecture with class discussion, Q&A
- Day3 Complete Ch5 Understanding residential building plans powerpoint and lecture then provide summary of chapter. Answer ch5 review questions then we will go over missed questions as a class with time for Q&A. Install lab wiring circuit after drawing floor pan with symbols.
- Day 4 Ch 5 Understanding residential building plans quiz and complete Lab 5.1 Framing components worksheet. Install lab wiring circuit after drawing floor pan with symbols.
- Day5 Ch 5 Understanding residential building plans Test. Instructor evaluation of Lab wiring circuit floor plan and installation

Resources

- Residential House Wiring Academy



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Unit Name	Determining Branch Circuit, Feeder Circuit, Service Entrance Requirements		
Grade Level(s)	11	Time / Duration	2 Week
Created (Date)	03/07/22	Revised (Date)	

Standards Addressed

List all standards that will be addressed during the unit.

- 1303 Use the NEC as a reference to questions and competencies that students perform for all electrical installations.
- 1108 Apply Ohm's/Watt's Law calculations to electrical applications.

Stage 1 - Desired Results: Enduring Understandings & Essential Questions

What are the overarching takeaways and big ideas for students?

Big Ideas	Load calculations are an essential part of an electrical system.
Transfer	<i>Students will be able to independently use their learning to...</i> • Perform load calculations as required by the NEC to size Electrical systems for a customer's home.
Meaning	<i>Students will understand that...</i> • There are two methods of performing load calculations using the standard method and the optional method.
Essential Questions	1. What is the load calculation in Volt-amps for a dwelling? 2. What is the term used for kitchen branch circuits?



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3. What is a demand factor ?
4. What is ambient temperature?

Stage 1 - Essential Content, Concepts, & Skills

What do we want students to know and be able to do?

Acquisition

Knowledge

Students will know...

- How to calculate electrical service sizes using the standard method?

Skills

Students will be skilled at (be able to do)...

- Determining the minimum number of general lighting branch circuits required for a dwelling.
- Understand NEC requirements for branch circuit sizing and loading.

Stage 2 - Assessments / Evidence of Learning

What are the formative (informal) and summative (formal) assessments used to measure learning and growth? How will you know that they did it?

Evaluation Criteria (F/S)

- Standard method service load calculation worksheet template(formative)
- Conductor ambient temperature corrections worksheet (formative)
- Standard method service load calculation and ambient temperature conductor quiz (summative)
- Standard method service load calculation and ambient temperature conductor Test(summative)

Assessment Evidence

Performance Task(s) / Think:

- Complete load calculations for various size square footages of a dwellings using the standard load calculation method template.
- Complete ambient temperature correction factors worksheet for various conductor sizes and insulation temperatures.
- Take standard method service load and ambient temperature conductor calculation quiz using blank service load calculation template with achieving a 75%
- Take standard method service load and ambient temperature conductor calculation Test using blank service load calculation template with achieving a 75%

- Instructors observation of service load and ambient temperature correction calculations worksheet

Other Evidence:

-

Stage 3 - Learning Plan



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What are the differentiated instructional strategies, activities, lesson plans that support the enduring understandings and essential questions for all students? This section provides a summary of the Key Learning Events and Instruction.

Summary of Key Learning Events and Instruction

- Day 1 Introduction into service loads using 2017 NEC Table 220.12
- Day Introduction into ambient temperatures using 2017 NEC table 310.15(b)(2)(a), 301.15.(b)(3)(a)
- Day3 Complete Instructor led worksheet examples on calculating Service loads and ambient temperature correction factors. Time for students to complete various calculations on their own.
- Day 4 Take a quiz on Standard method service load calculation and ambient temperature conductor correction factors.
- Day5 Take a test on Standard method service load calculation and ambient temperature conductor correction factors.

Resources

- NEC Text



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Unit Name	Introduction into Residential Electrical Services		
Grade Level(s)	11	Time / Duration	2 Week
Created (Date)	09/29/22	Revised (Date)	

Standards Addressed

List all standards that will be addressed during the unit.

- 1200 ELECTRICAL SERVICE
- 1201 Install an overhead service.
- 1202 Identify parts of an underground service

Stage 1 - Desired Results: Enduring Understandings & Essential Questions

What are the overarching takeaways and big ideas for students?

Big Ideas	1. Electrical services are the heart of the home's electrical system.
Transfer	<i>Students will be able to independently use their learning to...</i> • Electrical services are usually located in the homes basement and control all the electricity in a home
Meaning	<i>Students will understand that...</i> • Electrical services are essential for all of use when using electrical equipment or appliances around our homes.
Essential Questions	1. What is a Loadcenter? 2. What is a Meter Socket used for? 3. What determines the size of the electrical service?



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4. What article in the NEC cover service requirements?

Stage 1 - Essential Content, Concepts, & Skills

What do we want students to know and be able to do?

Acquisition

Knowledge

Students will know...

- How to calculate the load of a home and install the correct size service by following Article 220 and 230 of the 2020 NEC for calculations and installation rules.

Skills

Students will be skilled at (be able to do)...

- The students will be able to calculate the load of a home by using Table 220.12 of the NEC and article 230 for installing a service according to NEC rules.

Stage 2 - Assessments / Evidence of Learning

What are the formative (informal) and summative (formal) assessments used to measure learning and growth? How will you know that they did it?

Evaluation Criteria (F/S)

Formative Assessment

- Read ch7 text and view all videos and powerpoints. (formative)
- Instructor powerpoint and Lecture and discussion. (formative)
- Identify parts of an overhead electrical service (formative)
- Review question at end of chapter. (formative)

Assessment Evidence

Performance Task(s) / Think:

- Students are to read the entire chapter and view all videos and powerpoints for better understanding.
- Students will follow Instructors powerpoint presentation and lecture and be ready to discuss and answer instructor questions for student understanding.
- Students will use Lab7.1 In Residential Wiring Construction academy workbook to identify major parts of an electrical service entrance.
- Students will answer all review questions with 75% or better.
- Students will take practice quizzes until a score Of 75% is achieved.
- Students will take ch 7 quiz trying for at least a 75% score.
- Students will install an overhead electrical service following all applicable codes. Instructor will inspect and score the installation once the project is completed.
- Student will take and pass the electrical service entrance test with a 75% or better score.



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Stage 3 - Learning Plan

What are the differentiated instructional strategies, activities, lesson plans that support the enduring understandings and essential questions for all students? This section provides a summary of the Key Learning Events and Instruction.

Summary of Key Learning Events and Instruction

- Students are to read the chapter in full, complete all lab exercises, review questions and all practice quizzes for the chapter. Instructor will provide powerpoint and lecture on electrical service entrances and demonstrate the installation of an overhead electrical service entrance.

Resources

- 2020 NEC
- Residential Construction Wiring Academy textbook
- Mindtap digital textbook videos
- Residential Construction Wiring Academy lab manual.



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UbD Curriculum Overview

Department	Electrical Occupations		
Course Name	Intermediate Electrical Occupations		
Course Summary	Electrical Occupations is a program which prepares students for electrical careers in both industry and construction. Electrical wiring systems in houses and commercial buildings are assembled, installed, and maintained by electricians. Electricians generally specialize in either construction or industrial maintenance although some do both. Construction electricians layout, assemble, install, and test electrical fixtures and wiring used in the electrical systems of construction sites. Maintenance electricians maintain and keep many different types of electrical equipment in good working order principally by detecting and repairing defective equipment before a breakdown occurs.		
Unit Name	General Requirements for Rough-In Wiring		
Grade Level(s)	11	Time / Duration	1Week
Created (Date)	1/9/23	Revised (Date)	

Standards Addressed

- 700 SWITCHES AND RECEPTACLES CIRCUITS
- 701 Install a duplex receptacle.
- 702 Install a single pole switch.
- 703 Install a 3-way switch.
- 704 Install a 4-way switch.
- 705 Install a split-wired duplex receptacle.
- 706 Install a Ground Fault Circuit Interrupter (GFCI) Receptacle.
- 707 Install an Arc-Fault Circuit Interrupter (AFCI).
- 708 Install a time control switch.
- 709 Install a range receptacle.
- 710 Install a dryer receptacle.

Stage 1 - Desired Results: Enduring Understandings & Essential Questions

What are the overarching takeaways and big ideas for students?

Big Ideas	Understanding general requirements for rough-in wiring will allow apprentices to seek and find employment in residential house wiring.
Transfer	• Student will take wiring rough-in requirement knowledge to seek employment in Residential house wiring
Meaning	• Students will be able to install residential house wiring following all



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	applicable requirements according to current NEC.
Essential Questions	1. What NEC article is used for electrical wiring requirements for installations. 2. What is the first stage of wiring a house called? 3. What NEC article covers wiring methods? 4. What is the rule called for installing receptacles in wall spaces?

Stage 1 - Essential Content, Concepts, & Skills

What do we want students to know and be able to do?

Acquisition

Knowledge	<i>Students will know...</i> • How to select the appropriate wiring methods, conductor types and electrical boxes for a residential electrical wiring system.
Skills	<i>Students will be skilled at (be able to do)...</i> • Installing appropriate wiring methods in residential electrical systems • Installing the correct conductor type for the appropriate area of the home. • Installing a complete electrical system for a residential house, following all NEC requirements.

Stage 2 - Assessments / Evidence of Learning

What are the formative (informal) and summative (formal) assessments used to measure learning and growth? How will you know that they did it?

Evaluation Criteria (F/S)	Assessment Evidence
• Vocabulary flash cards(Formative)	• Student will use flashcards to learn new



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• Chapter outline (Formative) • Chapter review questions (Formative) • Instructor powerpoint presentation (Formative) • Install a basic residential wiring circuit (Formative)	vocabulary words and their definitions • Student will take notes when reading the chapter • Students will answer review questions for measuring knowledge. • Student will follow instructor led powerpoint presentation with time for Q&A • Students will install a basic house wiring circuit in a training booth following applicable NEC requirements.
• Chapter Practice Quizzes (Summative) • Chapter Quiz (Summative) • Chapter Test (Summative) • Performance Test (Summative)	• Students will take practice quizzes until a 75% or better score is achieved • Students will take chapter quizzes with a 75% or better score. • Students will take a chapter test with a 75% or better score. • Students will wire a basic house wiring circuit following all applicable codes and must pass Instructors inspection.

Stage 3 - Learning Plan

What are the differentiated instructional strategies, activities, lesson plans that support the enduring understandings and essential questions for all students? This section provides a summary of the Key Learning Events and Instruction.

Summary of Key Learning Events and Instruction

Day 1 Introduction to General wiring requirements, reference previous chapters Vocabulary words and definitions completed daily as bellringer activities.

Day 2&3 Students are to read assigned pages and answer daily essential questions. Instructor will use daily powerpoint to follow along with daily readings with time for Q&A.

Students will practice installing various basic house wiring circuits in training booths.

Students will answer review questions and Instructor will go over review questions to check for understanding and answer any questions.

Day 4 Students are to answer all practice quizzes until a score of 75% or better is achieved. Once a 75% or better is achieved the student will take the Chapter quiz .

Students will install a basic wiring circuit in a training booth and have instructor critique the wiring using an inspector's eye.

Day 5 Student will take chapter test for assessment of knowledge

The student will complete a basic house wiring circuit in the training booth following all applicable codes. The instructor will inspect and grade the project.



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Resources

- Residential Construction Academy House wiring Textbook/ Mindtap Digital
- 2020 NEC
- You tube videos
- Mike Holt Videos



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UbD Curriculum Overview

Department	Vocational		
Course Name	Intermediate Electrical Occupations		
Course Summary			
Unit Name	Hardware and Materials Used in Residential Wiring		
Grade Level(s)	11	Time / Duration	2 weeks
Created (Date)	3/2/23	Revised (Date)	

Standards Addressed

- 500 ANCHORS AND SUPPORTS
- 501 Identify, select and install various types of anchors and supports.

Stage 1 - Desired Results: Enduring Understandings & Essential Questions

What are the overarching takeaways and big ideas for students?

Big Ideas	Understanding the hardware and materials used in residential wiring is essential for safe and efficient electrical installations.
Transfer	• Students will understand the importance of selecting appropriate hardware and materials for safe and efficient electrical installations in residential wiring.
Meaning	• Identify and describe the function of common hardware and materials used in residential wiring • Explain the importance of selecting appropriate hardware and materials for specific electrical installations • Demonstrate safe practices when working with hardware and materials used in residential wiring •



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Essential Questions

- What are the essential components of residential wiring?
- Why is it important to use appropriate hardware and materials in electrical installations?
- How do you select the appropriate hardware and materials for specific electrical installations?
- What are the safety practices when working with hardware and materials used in residential wiring?

Stage 1 - Essential Content, Concepts, & Skills

What do we want students to know and be able to do?

Acquisition

Knowledge

Students will know...

- Identify and describe the function of common hardware and materials used in residential wiring
- Explain the importance of selecting appropriate hardware and materials for specific electrical installations
- Demonstrate safe practices when working with hardware and materials used in residential wiring
-

Skills

Students will be skilled at (be able to do)...

- Students will be able to identify and describe the function of common hardware and materials used in residential wiring.
- Students will be able to explain the importance of selecting appropriate



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- hardware and materials for specific electrical installations.
- Students will be able to demonstrate safe practices when working with hardware and materials used in residential wiring.

Stage 2 - Assessments / Evidence of Learning

What are the formative (informal) and summative (formal) assessments used to measure learning and growth? How will you know that they did it?

Evaluation Criteria (F/S)	Assessment Evidence
Formative Assessment - Lectures - Powerpoint presentations - Group Discussions - Teacher /student Q & A Summative Assessment - Quizzes - Tests - Final Exam (written) - Final Exam (performance)	- Students will work in small groups to plan and execute a small electrical installation using appropriate hardware and materials - Students will be evaluated based on their ability to select appropriate hardware and materials for the electrical installation and their safe practices during the installation process. - Students will be evaluated based on their ability to select appropriate hardware and materials for the electrical installation and their safe practices during the installation process.
	- Written quiz to assess student understanding of the hardware and materials used in residential wiring - Class discussions and reflection activities to assess student understanding and application of



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knowledge and skills.

Stage 3 - Learning Plan

What are the differentiated instructional strategies, activities, lesson plans that support the enduring understandings and essential questions for all students? This section provides a summary of the Key Learning Events and Instruction.

Summary of Key Learning Events and Instruction

Day 1: Introduction to Residential Wiring

- Introduction to the unit and explanation of its importance
- Overview of residential wiring and its components
- Introduction to common hardware and materials used in residential wiring

Day 2: Types of Wire and Cable

- Introduction to different types of wire and cable used in residential wiring, including their characteristics and uses
- Discussion of the importance of selecting the appropriate type of wire and cable for specific electrical installations

Day 3: Electrical Boxes and Conduit

- Introduction to electrical boxes and conduit, including their functions and types
- Discussion of the importance of selecting the appropriate type of box and conduit for specific electrical installations

Day 4: Switches and Outlets

- Introduction to switches and outlets, including their functions and types
- Discussion of the importance of selecting the appropriate type of switch or outlet for



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specific electrical installations

Day 5: Wire Nuts and Connectors

- Introduction to wire nuts and connectors, including their functions and types
- Discussion of the importance of selecting the appropriate type of wire nut or connector for specific electrical installations

Day 6: Safety Practices

- Discussion of the importance of safety practices when working with hardware and materials used in residential wiring
- Demonstration of safe practices for handling and installing hardware and materials

Day 7: Review and Assessment

- Review of the hardware and materials used in residential wiring
- Assessment of student understanding through a written quiz

Day 8-9: Application and Hands-on Activities

- Students will work in small groups to plan and execute a small electrical installation using appropriate hardware and materials
- Teacher will provide guidance and support as needed, and monitor for safe practices

Day 10: Reflection and Discussion

- Students will reflect on their experiences working with hardware and materials used in residential wiring
- Discussion of the challenges and successes encountered during the hands-on activities



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Resources

- Residential Construction Academy House Wiring
- Hardware and Material Handout