UTILITY LINEMAN/
ELECTRICAL LINE WORKER
REGISTERED APPRENTICE COURSES AND CERTIFICATES/DEGREE
MISSISSIPPI CURRICULUM FRAMEWORK

Program CIP: 46.0303-Utility Lineman
CIP 46.0301-Electrical Line Worker

2021

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The Office of Curriculum and Instruction (OCI) was founded in 2013 under the Division of Workforce, Career, and Technical Education at the Mississippi Community College Board (MCCB). The office is funded through a partnership with The Mississippi Department of Education (MDE), who serves as Mississippi's fiscal agent for state and federal Career and Technical Education (CTE) Funds. The OCI is tasked with developing statewide CTE curriculum, programming, and professional development designed to meet the local and statewide economic demand.

For information, please contact curriculum@mccb.edu

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NATIONAL CERTIFICATION & STANDARDS

The National Center for Construction Education and Research

NCCER is a not-for-profit 501(c) (3) education foundation created in 1996 as The National Center for Construction Education and Research. It was developed with the support of more than 125 construction CEOs and various association and academic leaders who united to revolutionize training for the construction industry. Sharing the common goal of developing a safe and productive workforce, these companies created a standardized training and credentialing program for the industry. This progressive program has evolved into curricula for more than 70 craft areas and a complete series of more than 70 assessments offered in over 4,000 NCCER-accredited training and assessment locations across the United States.

NCCER develops standardized construction and maintenance curriculum and assessments with portable credentials. These credentials are tracked through NCCER's Registry System that allows organizations and companies to track the qualifications of their craft professionals and/or check the qualifications of possible new hires. NCCER's Registry System also assists craft professionals by maintaining their records in a secure database.

For more information, please visit www.nccer.org.

Industry Job Projection Data

The Utility Lineman requires Postsecondary Career and Technical Award. There is expected to be a 6.25% increase in occupational demand at the regional level and the state level and 2.09% increase at the national level. Median annual income for this occupation is $55,971.00 at the state level. A summary of occupational data from www.swib.ms.gov/DataCenter/ is displayed below:

Table 1: Education Level

Program Occupations	Education Level
First-Line Supervisors/Managers of Mechanics, Installers, and Repair	Work experience in related field
Electrical Power-Line Installers and Repairs	Long term on the job training

Table 2: Occupational Overview

	Region	State	United States
2016 Occupational Jobs	5,950	5,950	597, 127
2026 Occupational Jobs	6,046	6,046	613,147
Total Change	96	96	16,020
Total % Change	1.16%	1.16%	2.68%
2016 Median Hourly Earnings	$26.91	$26.91	$31.27
2016 Median Annual Earnings	$55,971	$55,971	$65,035
Annual Openings	10	10	55,100

Table 3: Occupational Breakdown

Description	2016 Jobs	2026 Jobs	Annual Openings	2016 Hourly Earnings	2026 Annual Earnings 2,080 Work Hours
First-Line Supervisors/Managers of Mechanics, Installers, and Repair	4,137	4,161	2	$26.71	$55,557
Electrical Power-Line Installers and Repairs	1,813	1,885	7	$27.45	$57,096
Total	5,950	6,046	10	$26.91	$55,973

Table 4: Occupational Change

Description	Regional Change	Regional % Change	State % Change	National % Change
First-Line Supervisors/Managers of Mechanics, Installers, and Repair	24	0.58%	0.58%	2.09%
Electrical Power-Line Installers and Repairs	72	3.97%	3.97%	4.53%

Articulation

At this time, there is no secondary Utility Lineman program to articulate into this postsecondary program.

Technical Skills Assessment

Colleges should report the following for students who complete the program with a career certificate, technical certificate, or an Associate of Applied Science Degrees for technical skills attainment. To use the approved Alternate Assessment for the following programs of study, colleges should provide a Letter of Notification to the Director of Career Technical Education at the MS Community College Board. Please see the following link for further instructions: http://www.mccb.edu/wkfEdu/CTDefault.aspx.

CIP Code	Program of Study	
46.0303	Utility Lineman	
	Standard Assessment	
	MS CPAS	

CIP Code	Program of Study	
46.0301	Electrical Line Worker	
	Standard Assessment	
	NCCER Core NCCER Utility Lineman Level I	Career Certificate (for Registered Apprenticeship also)
	DOL Registered Apprentice Certificate	Technical Certificate (For registered Apprenticeship ONLY)

ONLINE AND BLENDED LEARNING OPPORTUNITIES

Course content includes lecture and laboratory semester credit hours. Faculty members are encouraged to present lecture related content to students in an online or blended learning environment. Training related to online and blended learning will be available to faculty members through the MS Community College Board.

ASSESSMENT STRATEGIES

The Office of Curriculum and Instruction's professional development offer assessment strategies to faculty members implementing the curriculum. Additionally, standards were included in course content when appropriate.

Research Abstract

In the fall of 2018, the Office of Curriculum and Instruction (OCI) met with the different industry members who made up the advisory committees for the Utility Lineman program. An industry questionnaire was used to gather feedback concerning the trends and needs, both current and future, of their field. Program faculty, administrators, and industry members were consulted regarding industry workforce needs and trends.

Industry advisory team members from the college involved with this program were asked to give input related to changes to be made to the curriculum framework. Specific comments related to soft skills needed in this program include having a positive attitude, being at work every day and on time, being able to work extended hours, weekend and holidays. Occupation-specific skills stated include knowing material identification, pole climbing, tool identification, underground and overhead construction, and knowledge of system operation.

Revision History

2011, Research and Curriculum Unit, Mississippi State University
2018, Office of Curriculum and Instruction, Mississippi Community College Board

CREDIT BY EXAMINATION

The following **NCCER** modules are aligned to courses listed below. Each module will serve as the state recommended exam to reward credit for prior learning experiences. Colleges have the local autonomy to create a college-level exam when awarding credit.

Course Number and Name	NCCER Credential and Module
ULT 1133 Safety for Line workers	NCCER Core Curriculum 1. Module 00101-15 Basic Safety 2. Module 00102-15 Introduction to Construction Math 3. Module 00103-15 Introduction to Hand Tools 4. Module 00104-15 Introduction to Power Tools 5. Module 00105-15 Introduction to Construction Drawing 6. Module 00106-15 Basic Rigging 7. Module 00107-15 Basic Communication Skills 8. Module 00108-15 Basic Employability Skills 9. Module 00109-15 Introduction to Materials Handling 10. Module 00101-15 Basic Safety 11. Module 00102-15 Introduction to Construction Math 12. Module 00103-15 Introduction to Hand Tools 13. Module 00104-15 Introduction to Power Tools 14. Module 00105-15 Introduction to Construction Drawing 15. Module 00106-15 Basic Rigging 16. Module 00107-15 Basic Communication Skills 17. Module 00108-15 Basic Employability Skills 18. Module 00109-15 Introduction to Materials Handling NCCER Pole Line Worker Level 1 Modules 1. Module 49102 Power Line Worker Safety 2. Module 49107 Tools of the Trade 3. Module 49113 Introduction to Electrical Test Equipment
ULT 1192 Fundamental of Electricity for Line workers	NCCER Pole Line Worker Level 1 Module 1. Module 49103 Introduction to Electrical Circuits 2. Module 49104 Introduction to Electrical Theory
ULT 1333 Basic Utility Operations	NCCER Pole Line Worker Level 1 Module 1. Module 49109
ULT 1413 Pole Climbing	NCCER Pole Line Worker Level 1 Module 1. Module 49105 Climbing Wooden Poles 2. Module 49106 Climbing Structures Other Than Wood
ULT 2133 Overhead Construction	NCCER Pole Line Worker Level 1 Module 1. Module 49108 Aerial Framing 2. Module 49110 Rigging 3. Module 49111 Setting and Pulling Poles
ULT 2143 Underground Construction	NCCER Pole Line Worker Level 1 Module 1. Module 49112 Trenching, Excavating, Boring Equipment 2. Module 49109 Utility Service Equipment

Program Description

The Lineworker Technology curriculum is designed to prepare the student for entry-level employment in the field of utility power transmission and distribution construction, troubleshooting, and repair. The curriculum includes Climbing in Elevated Work Site (Pole Climbing), Overhead Construction, Underground Construction, System Design and Operation, National Electric Safety Code, AC and DC Circuits, and Electric Power. Electives are available in advanced levels of utility line worker technology. This pathway offers an Accelerated Pathway Credential/15 hour certificate, Career certificate, Technical certificate and/or an Associate of Applied Science Degree.

The line worker competencies required in this curriculum were developed to coincide with the standards for the electric power generation, distribution, and transmission industry as described in the United States Department of Labor Occupational Safety and Health Administration.

SUGGESTED COURSE SEQUENCE

Career Readiness Certificate for Registered Apprenticeships Pathway for Line workers

(Electrical Line worker Pathway)

			SCH Breakdown			Program Certifications
Course Number	Course Name	Semester Credit Hours	Lecture	Lab	Total Contact Hours	
ULT 1122	Line Worker Safety	2				
ULT 1112	Interpersonal Skills for Line workers	2				
ULT 1324	Truck Driving for Line workers	4				
ULT 1523	National Electrical Code	3				
Choose an elective pathway.						
Electrical Line worker Pathway						
ULT 1192	Fundamentals of Electricity for Line workers	2				
ULT 1413	Pole Climbing	3				
Telecommunications Utility Line worker Pathway						
ULT 1413	Pole Climbing	3				
TCT 1112	Fundamentals of Telecommunications	2				
Underground Utility Line worker Pathway						
ULT 1192	Fundamentals of Electricity for Line workers	2				
ULT 2143	Underground Construction	3				
	Total	**16**				

COURSES ARE RECOMMENDED TO BE TAKEN IN THE ORDER IN WHICH THEY ARE DESIGNED.

Career Certificate for Registered Apprenticeships Required Courses (Electrical Line worker Pathway)

			SCH Breakdown			Program Certifications
Course Number	Course Name	Semester Credit Hours	Lecture	Lab	Total Contact Hours	
ULT 1122	Line Worker Safety	2				
ULT 1112	Interpersonal Skills for Line workers	2				
ULT 1324	Truck Driving for Line workers	4				
ULT 1523	National Electrical Code	3				
ULT 1192	Fundamentals of Electricity for Line workers	2				
ULT 1413	Pole Climbing	3				
ULT 2013	Line worker Registered Apprentice 1	3				
ULT 2023	Line worker Registered Apprentice 2	3				
ULT 2034	Line worker Registered Apprentice 3	4				
ULT 2044	Line worker Registered Apprentice 4	4				
	TOTAL	**30**				

COURSES ARE RECOMMENDED TO BE TAKEN IN THE ORDER IN WHICH THEY ARE DESIGNED.

Technical Certificate for Registered Apprenticeships Required Courses **(Electrical Line worker Pathway)**

			SCH Breakdown			Program Certifications
Course Number	Course Name	Semester Credit Hours	Lecture	Lab	Total Contact Hours	
ULT 2053	Line worker Registered Apprentice 5	3				
ULT 2063	Line worker Registered Apprentice 6	3				
ULT 2073	Line worker Registered Apprentice 7	3				
ULT 2083	Line worker Registered Apprentice 8	3				
ULT 2093	Line worker Registered Apprentice Capstone	3				
	Total	15				

COURSES ARE RECOMMENDED TO BE TAKEN IN THE ORDER IN WHICH THEY ARE DESIGNED.

General Education Core Courses

To receive the Associate of Applied Science degree, a student must complete all of the required coursework found in the Career Certificate option, Technical certificate option, and a minimum of 15 semester hours of General Education core. The courses in the General Education Core may be spaced out over the entire length of the program so that students complete some academic and Career Technical courses each semester or provided primarily within the last semester. Each community college will specify the actual courses that are required to meet the General Education Core Requirements for the Associate of Applied Science degree at their college. The Southern Association of Colleges and Schools Commission on Colleges (SACSCOC) Section 9 Standard 3 of the *Principles of Accreditation: Foundations for Quality Enhancement*[1] describes the general education core.

Section 9 Standard 3:

3. The institution requires the successful completion of a general education component at the undergraduate level that

   a) is based on a coherent rationale.

   b) is a substantial component of each undergraduate degree program. For degree completion in associate programs, the component constitutes a minimum of 15 semester hours of the equivalent; for baccalaureate programs, a minimum of 30 semester hours or the equivalent.

   c) ensures breadth of knowledge. These credit hours include at least one course from each of the following areas: humanities/fine arts, social/behavioral sciences, and natural science/mathematics. These courses do not narrowly focus on those skills, techniques, and procedures specific to a particular occupation or profession.

General Education Courses

			SCH Breakdown			Contact Hour Breakdown		Certification Information
Course Number	Course Name	Semester Credit Hours	Lecture	Lab	Total Contact Hours	Lecture	Lab	Certification Name
	Humanities/Fine Arts	3						
	Social/Behavioral Sciences	3						
	Math/Science	3						
	Academic electives	6						
	TOTAL	**15**						

[1] Southern Association of Colleges and Schools Commission on Colleges. (2017). *The Principles of Accreditation: Foundations for Quality Enhancement*. Retrieved from http://www.sacscoc.org/2017ProposedPrinc/Proposed%20Principles%20Adopted%20by%20BOT.pdf

UTILITY LINEMAN COURSES

*Any course not listed as a required course may be used as an elective.

			SCH Breakdown				Program Certifications
Course Number	Course Name	Semester Credit Hours	Lecture	Lab	Externship	Total Contact Hours	
DTV 1114	Commercial Truck Driving	4					
ULT 1118	Electric Lineman I	8					
ULT 1128	Electric Lineman II	8					
ULT 1122	Line Worker Safety	2					
ULT 1133	Safety for Line Workers	3					
ULT 1313	Line Worker Truck Driving	3					
ULT 1324	Truck Driving Line Workers	4					
ULT 1333	Basic Utility Equipment Operations	**3**					
ULT 1144	AC and DC Circuits for Line Workers	4					
ULT 1413	Pole Climbing	3					
ULT 1523	National Electrical Safety Code	**3**					
ULT 1514	Overhead, Underground, and Substation Construction	4					
ULT 1623	Lineworker Computer Fundamentals	3					
ULT 1192	Fundamentals of Electricity for Lineworkers	2					
ULT 2133	Overhead Construction	3					
ULT 2143	Underground Construction	3					
ULT 2233	System Design and Operation	3					
ULT 2244	Working in Elevated Work Sites	4					
	All other electives approved by instructor per local community college policy						

COURSE DESCRIPTIONS

Course Number and Name: **ULT 1112** **Interpersonal Skills for Line Workers**

Description: This course is designed to cover the basic communication skills for interaction with others.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
2	2	0	30

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Discuss customer service.
2. Discuss listening skills.
3. Discuss communication.

Course Number and Name: **ULT 1118** **Electrical Lineman I**

Description: This course covers basic electricity, OSHA standards, CPR instruction and basic computer technology.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
8	4	8	180

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Demonstrate effective communication by diagramming a pre-trip inspection.
2. Demonstrate a present a pre-trip inspection.
3. Demonstrate the ability to perform basic operations of the hydraulic systems of the Derrick and Bucket Trucks.
4. Demonstrate proficiency using a basic word processor to produce a job resume to present to sponsoring companies on Job Fair Day.
5. Demonstrate the ability to discuss customer service.

Course Number and Name: **ULT 1122 Line Worker Safety**

Description: This course is designed to provide fundamental safety rules and procedures needed in performing basic line worker skills.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
2	2	0	30

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Discuss OSHA standards 269
2. Provide approved CPR and first aid training and certification
   a. Discuss transference and avoidance of blood borne pathogens.
3. Demonstrate the proper use of personal protective equipment as prescribed by OSHA.
4. Discuss job-site safety.
   a. Demonstrate safety procedures relating to chain saws.
   b. Discuss safety procedures relating to hydraulic tool operations.
   c. Discuss pole safety inspection procedures.
5. Discuss the importance of the proper handling of HazMat (Hazardous Materials) and MSDSs (Material Safety Data Sheets) as required by OSHA.
6. Discuss/ Demonstrate proper testing, grounding, and flagging.

Course Number and Name: **ULT 1128** **Electrical Lineman II**

Description: This course covers transformers, electric codes, pole climbing, and RUS specifications.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
8	4	8	180

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Demonstrate critical thinking skills to correctly perform banking and rigging.
2. Manipulate Ohm's Law of math formulas to solve values of voltage, current, resistance, and power.

Course Number and Name: **ULT 1133** **Safety for Line Workers**

Description: This course is designed to provide fundamental safety rules and procedures needed in performing basic line worker skills.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Discuss OSHA standards. 269 NCCER CORE,NCCER Level 1 Module 49102,Module 49107, Module 49133
2. Provide American Red Cross CPR and first aid training and certification. NCCER CORE, Module 49102,Module 49107, Module 49133
   a. Discuss transference and avoidance of blood-borne pathogens
3. Demonstrate the proper use of personal protective equipment as prescribed by OSHA. NCCER CORE, Module 49102,Module 49107, Module 49133
4. Discuss job-site safety NCCER CORE
   a. Demonstrate safety procedures relating to hydraulic tool operations.
   b. Demonstrate safety procedures relating to hydraulic tool operations.
   c. Apply pole safety inspection procedures.
5. Explain the importance of the proper handling of HazMat (Hazardous Materials) and MSDSs (Material Safety Data Sheets) as required by OSHA. NCCER CORE, Module 49102,Module 49107, Module 49133
6. Discuss Lockout Tagout procedures. NCCER CORE, Module 49102,Module 49107, Module 49133
7. Discuss/Demonstrate proper grounding techniques. NCCER CORE, Module 49102,Module 49107, Module 49133
8. Discuss/ Demonstrate proper testing, grounding and flagging for emergency restorations. NCCER CORE, Module 49102,Module 49107, Module 49133

National Center for Construction Education and Research Standards

NCCER Pole Line Worker Core Modules

Module 00101-15	**Basic Safety**
Module 00102-15	**Introduction to Construction Math**
Module 00103-15	**Introduction to Hand Tools**
Module 00104-15	**Introduction to Power Tools**
Module 00105-15	**Introduction to Construction Drawing**
Module 00106-15	**Basic Rigging**
Module 00107-15	**Basic Communication Skills**
Module 00108-15	**Basic Employability Skills**
Module 00109-15	**Introduction to Materials Handling**
Module 00101-15	**Basic Safety**
Module 00102-15	**Introduction to Construction Math**
Module 00103-15	**Introduction to Hand Tools**
Module 00104-15	**Introduction to Power Tools**
Module 00105-15	**Introduction to Construction Drawing**
Module 00106-15	**Basic Rigging**
Module 00107-15	**Basic Communication Skills**
Module 00108-15	**Basic Employability Skills**
Module 00109-15	**Introduction to Materials Handling**

NCCER Pole Line Worker Level 1 Modules

Module 49102	**Power Line Worker Safety**
Module 49107	**Tools of the Trade**

Module 49113 **Introduction to Electrical Test Equipment**
Course Number and Name: **ULT 1144** **AC and DC Circuits for Line Worker Technology**

Description: Principles and theories associated with AC and DC circuits used in the electrical trades. Includes the study of electrical circuits, law, and formulas and the use of test equipment to analyze AC and DC circuits.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
4	3	2	75

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Demonstrate and practice general safety procedures in the school and work-site environments.
   a. Apply relevant and appropriate safety techniques.
   b. Demonstrate and comply with relevant OSHA safety standards.
2. Demonstrate and apply a basic AC/DC electrical circuit.
3. Demonstrate the meaning of and relationships among and between voltage, current, resistance, and power in AC and DC circuits.
   a. Explain the relationship between voltage, current, and resistance in AC and DC circuits.
   b. Explain how power is developed in a circuit.
   c. Explain proper techniques for connecting a voltmeter or current meter to make measurements.
4. Analyze and evaluate the parameters of AC and DC series, parallel, and series-parallel circuits.

5. Analyze transformer voltage, current, impedance transformations, and applications.
   a. Calculate primary and secondary transformer voltage and current as related to the transformer's turns ratio.
   b. Explain the theory of reflected impedance between the primary and secondary, or secondaries, of utility transformers.
   c. Explain various transformer ratings, such as voltage, current, power, impedance, frequency, and efficiency.
   d. Explain various transformer losses such as winding losses and core losses.
   e. Construct transformer circuits, and measure voltages and currents as calculated.

Registered Apprenticeship SLOs only.

- Demonstrate a working knowledge and use of PPE equipment (1.1.1, 1.1.4, 1.2.10)
- Discuss and study the concepts and applications of first aid (1.1.2)
- Obtain an understanding of the complete electric system, to include: electrical terms, Ohms Law, and quantities of electrical units (1.1.3, 1.2.2, 1.2.4, 1.2.7)
- Obtain a thorough knowledge of the safe and proper use of rigging, splicing, and knotting rope (1.1.5, 1.1.6)
- Demonstrate a knowledge of wood poles and there uses (1.1.7)
- Demonstrate a good foundation of the basic principles of matter, the elements and the atom as it pertains to electricity (1.1.8)
- Demonstrate and apply an understanding of mathematics in the workplace, to include: addition, subtraction, fractions, and basic algebra (1.1.9, 1.1.10, 1.2.3)
- Utilize the use of USDA Specifications and Drawings for 12.47/7.2 kv Line Construction to apprenticeship tasks (1.2.1)

- Discuss the relationship between current, voltage, and resistance in a series circuit (1.2.5)
- Obtain a knowledge of underground cables, their design, and applications as their pertain to overhead conductors. (1.2.6)
- Obtain an understanding of the physical and electrical properties of copper and aluminum conductors (1.2.6.)
- Discuss electromagnetic induction as it relates to alternating current (1.2.8)
- Discuss the fundamental principles on which transformer, regulators, motors, generators, and other electrical apparatus work (1.2.8)
- Obtain an understanding of different types of batteries, how they are constructed and the principles that make each work for a complete understanding of electricity (1.2.9)

Course Number and Name: **ULT 1152 AC and DC Circuits for Utility Line Worker Technology**

Description: Principles and theories associated with AC and DC circuits used in the electrical trades. Includes the study of electrical circuits, laws and formulas, and the use of test equipment to analyze DC circuits.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
2	1	2	30

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Demonstrate and practice general safety procedures in the school and work-site environments.
   a. Apply relevant and appropriate safety techniques.
   b. Demonstrate and comply with relevant OSHA safety standards.
2. Demonstrate and apply a basic AC/DC electrical circuit.
3. Demonstrate the meaning of and relationships among and between voltage, current, resistance, and power in AC and DC circuits.
   a. Explain the relationship between voltage, current and resistance in AC and DC circuits.
   b. Explain how power is developed in a circuit.
   c. Explain proper techniques for connecting a voltmeter or current meter to make measurements.
4. Analyze and evaluate the parameters of AC and DC series, parallel, and series-parallel circuits.
5. Analyze transformer voltage, current, impedance transformations and applications.
   a. Calculate primary and secondary transformer voltage and current as related to the transformer turns ratio.
   b. Explain the theory of reflected impedance between the primary and secondary or secondary's, of utility transformers.
   c. Explain various transformer ratings, such as voltage, current, power, impedance, frequency, and efficiency.
   d. Explain various transformer losses such as winding losses and core losses.
   e. Construct transformer circuits, and measure voltage and currents as calculated.

Course Number and Name: **ULT 1192** **Fundamentals of Electricity for Line Workers**

Description: Fundamental skills associated with all electrical courses. Safety, basic tools, special tools, equipment, and introduction to AC and DC circuits.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
2	1	2	30

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Apply general safety procedures in the shop, lab, and industrial environment. NCCER Level 1 49103
   a. Apply proper safety techniques for all types of circuits and components used in the utility craft.
   b. Demonstrate an understanding of and comply with relevant OSHA, NEC, and NESC safety standards.
2. Demonstrate use of electrical tools, equipment, and references. NCCER Level 1 49103
   a. Identify and demonstrate proper use of basic tools such as meters, drills, and other hand held equipment.
   b. Demonstrate the use of and reading of a rule and/or measuring tape.
   c. Locate and interpret information in the NESC relative to a specific job.
3. Solve problems using Ohm's law. NCCER Level 1 49103
   a. List three formulae for Ohm's law.
4. Solve problems for an unknown voltage, amperage, resistance, and wattage. NCCER Level 1 49103

National Center for Construction Education and Research Standards

Module 49103 **Introduction to Electrical Circuits**
Module 49104 **Introduction to Electrical Theory**

Course Number and Name: **ULT 1213 Electric Power**

Description: Electrical motors and their installation. Instruction and practice in using the different types of motors, protection devices, switches, transformers, and alternators found in utility transmission

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Discuss safety and environmental protection concerns associated with electrical power equipment. NCCER Level 1 49102
   a. List safety precautions associated with motors and transformers.
   b. Explain the procedures for working with a disposing of hazardous materials.
2. Wire single phase electrical components. NCCER Level 1 49103, NCCER Level 149104
   a. Sketch and connect a single phase transformer for high and low voltage applications.
   b. Identify, sketch and wire different types of three phase motors to include low and high voltage requirements.
   c. Explain and demonstrate the applications of an AC generator. NCCER Level 1 49104
3. Wire three- phase electrical components.
   a. Identify, draw, and wire different types of three-phase motors to include low and high voltage requirements.
4. Wire three-phase electrical components found in utility transmission.
   a. Sketch and connect components found in power grids such as lighting arrestors, surge protectors, high voltage switches, arc arrestors, and others as required by the instructor. NCCER Level 1 49107
   b. Identify low and high voltage requirements. NCCER Level 1 49109
   c. Basic overview of electric power generation, transmission and distribution to the consumer meter. NCCER Level 49109

National Center for Construction Education and Research Standards
Module 49102
Module 49103
Module 49104
Module 49107
Module 49109

Course Number and Name: **ULT 1213** **Electric Power**

Description: Electrical motors and their installation. Instruction and practice in using the different types of motors, protection devices, switches, transformers, and alternators found in utility transmission.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Discuss safety and environmental protection concerns associated with electrical power equipment. (ELT 2.2 ELT 3.7)
   a. List safety precautions associated with motors and transformers.
   b. Explain the procedures for working with and disposing of hazardous materials.
2. Wire single phase electrical components.
   a. Sketch and connect a single phase transformer for high and low voltage applications.
   b. Identify sketch, and wire different types of single phase motors.
   c. Explain and demonstrate the application of an AC generator.
3. Wire three-phase electrical components.
   a. Identify, draw, and wire different types of three-phase motors to include low and high voltage requirements.
4. Wire three-phase electrical components found in utility transmission.
   a. Sketch and connect components found in power grids such as lighting arrestors, surge protectors, high voltage switches, arc arrestors, and others as required by the instructor.
   b. Identify, draw, and wire different types of three phase protection devices to include low and high voltage requirements.
   c. Basic overview of electric power generation, transmission, and distribution to the consumer meter.

Course Number and Name: **ULT1223** **Transformer Operation and Banking**

Description: This course is designed to cover basic single phase operations and Delta and "Wye" Transformer Banks including hookups for 120/208—240/480/--120/240—277/480.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Discuss safety and environmental protection concerns associated with electrical power. Equipment.
   a. List safety precautions associated with motors and transformers.
   b. Explain the procedures for working with and disposing of hazardous materials.
2. Wire single phase electrical components.
   a. Sketch and connect a single phase transformer
3. Wire three-phase electrical components.
   a. Sketch and connect AC transformers to include delta and wye and three wire and four-wire systems.
   b. Demonstrate installation of a three-phase open and closed transformer bank.
   c. Discuss troubleshooting techniques.
   d. Discuss rotation and phasing

Course Number and Name: **ULT 1232** **Electrical Power and Transformer Banking for Line Workers**

Description: This course is designed to cover basic single phase operations and Delta and "Wye" Transformer Banks including hookups for 120/208-240/480/--120/240_227/480.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
2	1	2	30

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Discuss safety and environmental protection concerns associated with electrical power equipment.
2. List safety and environmental protection concerns associated with electrical power equipment.
3. Explain the procedures for working with and disposing of hazardous materials.
4. Wire single and three phase electrical components.
   a. Sketch and connect a single and three phase transformers including delta wye and three wire and four wire systems.
5. Discuss troubleshooting techniques.
6. Discuss rotation and phasing.

Course Number and Name: **ULT 1313** **Line Worker Truck Driver**

Description: This course is designed to provide a line worker with fundamental skills needed to obtain a Class A CDL (Commercial Driver's License) with air brake endorsement.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Demonstrate the ability to discuss safety precautions in the operation of a DOT regulated combination vehicle with air brake endorsement.
   a. Discuss rules of the road.
   b. Discuss precautions to take in driving during daylight and nighttime under various road conditions.
   c. Identify and discuss highway signs and the meaning of each.
   d. Discuss DOT rules and regulations.
2. Demonstrate the ability to plan a route and perform a pre-trip inspection.
   a. Identify safety precautions needed prior to a trip.
   b. Discuss the procedures to follow prior to a trip.
   c. Perform a pre-trip inspection.
3. Demonstrate the ability to perform basic operations of the DOT regulated combination vehicle with air brake endorsement.
   a. Safely couple and uncouple a DOT regulated combination vehicle with air brake endorsement.
   b. Upshift and down shift a manual truck transmission.
   c. Explain and demonstrate the use of rear and side mirrors while driving and safe spacing behind vehicles.
4. Safely perform maneuvers listed in the skills assessment as prescribed by MDOT of a combination vehicle.
5. Obtain Class A CDL with air brake endorsement.

Course Number and Name: **ULT 1324** **Truck Driving for Line Workers**

Description: This course is designed to provide a line worker with fundamental skills needed to obtain a Class A CDL (Commercial Driver's License) with air brake endorsement.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
4	1	6	90

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Demonstrate the ability to discuss safety precautions in the operation of a DOT regulated combination vehicle with air brake endorsement.
   a. Discuss rules of the road.
   b. Discuss precautions to take in driving during daylight and nighttime under various road conditions.
   c. Identify and discuss highway signs and the meaning of each.
   d. Discuss DOT rules and regulations.
2. Demonstrate trip planning procedures.
3. Demonstrate the ability to do a pre-trip inspection
   a. Identify safety procedures needed prior to a trip.
   b. Discuss the procedures to follow prior to a trip
   c. Perform a pre-trip inspection
4. Demonstrate the ability to perform basic operations of the DOT regulated combination vehicle with air brake endorsement.
   a. Safely couple and uncouple a DOT regulated combination vehicle with air brake endorsement.
   b. Upshift and downshift manual truck transmission.
   c. Explain and demonstrate the use of rear and side mirrors while driving.
   d. Explain and demonstrate the correct spacing behind vehicles.
   e. Park a combination vehicle.
5. Develop the ability to safely maneuver a combination vehicle.
   a. Maneuver a combination through a 12 ft opening.
   b. Maneuver a combination through a left-hand turn at an intersection.
   c. Maneuver a combination through right hand turn at an intersection.
6. Obtain Class A CDL with air brake endorsement.

Course Number and Name: **ULT 1333** **Basic Utility Equipment Operation**

Description: This course is designed to prepare students in the basic operation of line worker equipment.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Demonstrate the safe use and operation of an aerial lift truck. NCCER Level 1 49109
2. Demonstrate the safe use and operation of a digger derrick. NCCER Level 1 49109
3. Demonstrate the safe use and operation of a fork lift. NCCER Level 1 49109
4. Demonstrate the safe use and operation of a chain saw. NCCER Level 1 49109
5. Demonstrate the safe use and operation of an ATV/RTV/UTV. NCCER Level 1 49109

National Center for Construction Education and Research Standards
Module 49109 Utility Service Equipment

Course Number and Name: **ULT 1413 Pole Climbing**

Description: This course is designed to provide a line worker with fundamental skills needed to perform basic pole climbing.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Discuss and demonstrate use and inspection of pole climbing equipment. NCCER Level 1 49105
2. Demonstrate pole climbing skills as prescribed by industry to include 100% fall protection. NCCER Level 1 49106

National Center for Construction Education and Research Standards

Module 49105 Climbing Wooden Poles
Module 49106 Climbing Structures Other Than Wood

Course Number and Name: **ULT 1514** **Overhead, Underground, and Substation Construction**

Description: This course is designed to provide further fundamental training in the field of electric line work dealing with the overhead/underground line construction and substation construction.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
4	2	4	90

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Apply industry standard specifications, materials, framing, and tool nomenclature for power system construction
2. Demonstrate framing and working on poles up to full height.
3. Demonstrate transformer change out
    a. Demonstrate rigging for transformer change out.
    b. Demonstrate proper equipment lifting.
    c. Demonstrate proper roper and knot tying techniques.
4. Demonstrate proper protective grounding procedures for power systems.
5. Discuss various types of devices used in substation construction.
6. Discuss the makeup of outdoor termination, elbows, and splices.
7. Discuss the fault finding techniques and various repairs.

Course Number and Name: **ULT 1523** **National Electric Safety Code (Safety Code)**

Description: This course is designed to introduce the students to the basic fundamentals and safety requirements as set forth in the National Electric Safety Code for the power line industry...

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Use the NESC as a reference manual to locate information and give a reference of where the information can be found.
2. Use the NESC to identify safety clearances in power line construction that includes other utilities: both overhead and underground.

Course Number and Name: **ULT 1612** **Computer Fundamentals for Line Workers**

Description: This course is designed to introduce students to basic computer skills.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
2	1	2	30

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Apply a basic understanding of an operating system.
   a. Show basic commands of operating system software
   b. Illustrate the use of work processing software.
   c. Demonstrate the use of spreadsheet software.
2. Demonstrate use of Internet.
   a. Browse the World Wide Web.
   b. Send electronic mail.

Course Number and Name: **ULT 1623** **Lineworker Computer Fundamentals**

Description: This course is designed to introduce students to basic computer skills.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Apply a basic understanding of an operating system.
    a. Show basic commands of operating system software.
2. Demonstrate use of the Internet.
    a. Browse the World Wide Web
    b. Send electronic mail.
3. Demonstrate the use of Blackboard.
4. Illustrate the use of word processing software.
5. Demonstrate the use of spreadsheet software.
6. Demonstrate the use of presentation software.

Course Number and Name: **ULT 2133** **Overhead Construction**

Description: This course is designed to provide further fundamental training in the field of electric line work dealing with the overhead line construction.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	1	4	75

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Apply industry standard specifications for pole framing. NCCER Level 1 49108
2. Discuss material and tool nomenclature. NCCER Level 1 49108
3. Demonstrate framing and working on poles up to full height. NCCER Level 1 49118
4. Demonstrate transformer change out from pole. NCCER Level 1 49110
   a. Demonstrate rigging for transformer change out.
   b. Demonstrate proper equipment lifting.
   c. Demonstrate proper roper and knot tying techniques.
5. Demonstrate proper protective pole grounding procedures for power systems. NCCER Level 1 49110

National Center for Construction Education and Research Standards

Module 49108 Aerial Framing
Module 49110 Rigging
Module 49111 Setting and Pulling Poles

Course Number and Name: **ULT 2143** **Underground Construction**

Description: This course is designed to provide further fundamental training in the field of electric line work dealing with the overhead to the underground line construction.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	1	4	75

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Apply industry standard specifications for underground construction. NCCER Level 1 491019
2. Discuss material and tool nomenclature. NCCER Level 1 491019
3. Demonstrate transformer change out. NCCER Level 1 491019
   a. Demonstrate rigging for transformer change out.
   b. Demonstrate proper equipment lifting
   c. Demonstrate proper rope and knot tying techniques
4. Demonstrate proper protective grounding procedures for power systems. NCCER Level 1 49112
5. Demonstrate proper protective grounding NCCER Level 1 49112
6. Demonstrate the makeup of outdoor termination, elbows and splices. NCCER Level 1 49112
7. Demonstrate the repairs of various secondary faults. NCCER Level 1 49112
8. Demonstrate the fault finding techniques. NCCER Level 1 49112

National Center for Construction Education and Research Standards
Module 49112 **Trenching, Excavating, Boring Equipment**
Module 49109 **Utility Service Equipment**

Course Number and Name: **ULT 2233** **System Design and Operation**

Description: This course includes operation basics for protection of the electrical systems overhead, underground, and substation

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	1	4	75

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Discuss types and uses of fuses. NCCER Level 1 49109
2. Discuss types and uses of oil circuit recloses NCCER Level 1 49109
3. Discuss the types and uses of regulators. NCCER Level 1 49109
4. Discuss the types and uses of capacitor banks. NCCER Level 1 49109
5. Discuss the types and uses of sectionalizes. NCCER Level 1 49109
6. Discuss the protective equipment use on lateral and dip/riser poles. NCCER Level 1 49109

Course Number and Name: **ULT 2244** **Working in Elevated Work Sites**

Description: This course is designed to provide a line worker with fundamental skills needed to perform basic pole climbing.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
4	1	6	105

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Discuss and demonstrate use and inspection of pole climbing equipment. NCCER Level 1 49106
2. Demonstrate pole climbing skills as prescribed by industry on full length poles. NCCER Level 1 49105
3. Discuss and demonstrate proper structural inspection procedures of full length pole, cross members, and support. NCCER Level 1 49106
4. Demonstrate the proper method of sharpening gaffs. NCCER Level 1 49105
5. Demonstrate proper climbing techniques on full length poles. NCCER Level 1 49105
6. Demonstrate bucket truck rescue procedures. NCCER Level 1 49105

Course Number and Name: **ULT 2333 Advanced Utility Equipment Operation**

Description: This course provides an in-depth understanding of the operation of line worker equipment.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Demonstrate the safe use and operation of an aerial lift truck. NCCER Level 1 49109
2. Demonstrate the safe use and operation of a digger derrick. NCCER Level 1 49109
3. Demonstrate the safe use and operation of a trencher/other equipment NCCER Level 1 49109
4. Demonstrate the safe use and operation of a fork lift. NCCER Level 1 49109
5. Demonstrate the safe use and operation of a chainsaw. NCCER Level 1 49109
6. Demonstrate the safe use and operation of an ATV/RTV/UTV. NCCER Level 1 49109

Course Number and Name: **ULT 291(1-3) Special Project**

Description: Practical application of skills and knowledge gained in other electrical or electrical related technical courses. This instructor works closely with the student to insure that the selection of a project will enhance the student's learning experience.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
1	0	2	30
2	0	4	60
3	0	6	90

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Develop a written plan and blueprints that detail the activities and projects to be completed.
   a. Utilize a written plan that details the activities and projects to be completed.
   b. Perform written occupational objectives in the special project.
2. Assess accomplishment of objectives.
   a. Prepare daily written assessment of accomplishment of objectives.
   b. Present weekly written reports to the instructor in activities performed and objectives accomplished.
3. Utilize a set of written guidelines for the special project.
   a. Develop and follow a set of written guidelines for the special project.

Course Number and Name: **ULT 292(1-3) Special Project**

Description: Practical application of skills and knowledge gained in other electrical or electrical related technical courses. This instructor works closely with the student to insure that the selection of a project will enhance the student's learning experience.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
1	0	2	30
2	0	4	60
3	0	6	90

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Develop a written plan and blueprints that detail the activities and projects to be completed.
   a. Utilize a written plan that details the activities and projects to be completed.
   b. Perform written occupational objectives in the special project.
2. Assess accomplishment of objectives.
   a. Prepare daily written assessment of accomplishment of objectives.
   b. Present weekly written reports to the instructor in activities performed and objectives accomplished.
3. Utilize a set of written guidelines for the special project.
   a. Develop and follow a set of written guidelines for the special project.

Course Number and Name: **ULT 293(1-3) Special Project**

Description: Practical application of skills and knowledge gained in other electrical or electrical related technical courses. This instructor works closely with the student to insure that the selection of a project will enhance the student's learning experience.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
1	0	2	30
2	0	4	60
3	0	6	90

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Develop a written plan and blueprints that detail the activities and projects to be completed.
   a. Utilize a written plan that details the activities and projects to be completed.
   b. Perform written occupational objectives in the special project.
2. Assess accomplishment of objectives.
   a. Prepare daily written assessment of accomplishment of objectives.
   b. Present weekly written reports to the instructor in activities performed and objectives accomplished.
3. Utilize a set of written guidelines for the special project.
   a. Develop and follow a set of written guidelines for the special project.

Course Number and Name: **ULT 294(1-3) Supervised Work Experience I**

Description: A cooperative program between industry and education and is designed to integrate the student's technical studies with industrial experience. Variable credit is awarded on the basis of semester hour per 45 industrial contact hours.

Hour Breakdown:

Semester Credit Hours	Lecture	Externship	Contact Hours
1-6	0	3-9	45-135

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Apply technical skills needed to be a viable member of the workforce.
   a. Prepare a description of technical skills to be developed in the supervised work experience program
   b. Develop technical skills needed to be a viable member of the workforce.
2. Apply skills developed in other program area courses.
   a. Perform skills developed in other program area courses in the supervised work experience program
3. Apply human relationship skills.
   a. Practice human relationship skills in the supervised work experience program.
4. Apply and practice positive work habits and responsibilities.
   a. Perform assignments to develop positive work habits and responsibilities.
5. Work with the instructor and employer to develop written occupational objectives to be accomplished.
   a. Perform written occupational objectives in the supervised occupational experience program
6. Assess accomplishment of objectives.
   a. Prepare daily written assessment of accomplishment of objectives.
   b. Present weekly written reports to instructor in activities performed and objectives accomplished
7. Utilize a set of written guideline for the supervised work experience
   a. Develop and follow a set of written guidelines for the supervised work experience.

Course Number and Name: **ULT 295(1-3) Supervised Work Experience II**

Description: A cooperative program between industry and education and is designed to integrate the student's technical studies with industrial experience. Variable credit is awarded on the basis of semester hour per 45 industrial contact hours.

Hour Breakdown:

Semester Credit Hours	Lecture	Externship	Contact Hours
1-6	0	3-9	45-135

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Apply technical skills needed to be a viable member of the workforce.
   a. Prepare a description of technical skills to be developed in the supervised work experience program
   b. Develop technical skills needed to be a viable member of the workforce.
2. Apply skills developed in other program area courses.
   a. Perform skills developed in other program area courses in the supervised work experience program
3. Apply human relationship skills.
   a. Practice human relationship skills in the supervised work experience program.
4. Apply and practice positive work habits and responsibilities.
   a. Perform assignments to develop positive work habits and responsibilities.
5. Work with the instructor and employer to develop written occupational objectives to be accomplished.
   a. Perform written occupational objectives in the supervised occupational experience program
6. Assess accomplishment of objectives.
   a. Prepare daily written assessment of accomplishment of objectives.
   b. Present weekly written reports to instructor in activities performed and objectives accomplished
7. Utilize a set of written guideline for the supervised work experience
   a. Develop and follow a set of written guidelines for the supervised work experience.

Course Number and Name: **ULT 2013 Line worker Registered Apprenticeship 1**

Description: A registered apprenticeship program between industry and education and is designed to integrate the student's technical studies with industrial experience.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab
3	3	0

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. 750 OJT hours is required as part of the Registered Apprenticeship.
2. Demonstrate a working knowledge and use of PPE equipment (1.1.1, 1.1.4, 1.2.10)
3. Discuss and study the concepts and applications of first aid (1.1.2)
4. Obtain an understanding of the complete electric system, to include: electrical terms, Ohms Law, and quantities of electrical units (1.1.3, 1.2.2, 1.2.4, 1.2.7)
5. Obtain a thorough knowledge of the safe and proper use of rigging, splicing, and knotting rope (1.1.5, 1.1.6)
6. Demonstrate a knowledge of wood poles and there uses (1.1.7)
7. Demonstrate a good foundation of the basic principles of matter, the elements and the atom as it pertains to electricity (1.1.8)
8. Demonstrate and apply an understanding of mathematics in the workplace, to include: addition, subtraction, fractions, and basic algebra (1.1.9, 1.1.10, 1.2.3)
9. Utilize the use of USDA Specifications and Drawings for 12.47/7.2 kv Line Construction to apprenticeship tasks (1.2.1)
10. Discuss the relationship between current, voltage, and resistance in a series circuit (1.2.5)
11. Obtain a knowledge of underground cables, their design, and applications as their pertain to overhead conductors. (1.2.6)
12. Obtain an understanding of the physical and electrical properties of copper and aluminum conductors (1.2.6.)
13. Discuss electromagnetic induction as it relates to alternating current (1.2.8)
14. Discuss the fundamental principles on which transformer, regulators, motors, generators, and other electrical apparatus work (1.2.8)
15. Obtain an understanding of different types of batteries, how they are constructed and the principles that make each work for a complete understanding of electricity (1.2.9)

Course Number and Name: **ULT 2023 Line worker Registered Apprenticeship 2**

Description: A registered apprenticeship program between industry and education and is designed to integrate the student's technical studies with industrial experience.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab
3	3	0

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. 750 OJT hours is required as part of the Registered Apprenticeship.
2. Demonstrate an understanding of Elementary Electrical Principles and the hazards of electrical shock (1.3.1, 1.3.2)
3. 1.3.3 Safety Procedures
4. Demonstrate an understanding of the Safety Policies and Procedures as outlined in the Safety Manual and in OSHA guidelines (1.3.3, 1.4.11)
5. Obtain a working knowledge of parallel and combination circuits (1.3.5, 1.3.6, 1.3.7)'
6. Obtain an understanding of backfeed and the situations in which they may occur (1.3.8)
7. Obtain a working knowledge of equipment operation (digger derrick, ladders, etc) on the job site and how to protect the public (1.3.9, 1.4.4, 1.4.5)
8. Demonstrate and apply an understanding of mathematics in the workplace, to include: percentages (1.3.10)
9. Obtain a basic understanding of percentages and how to calculate them
10. Obtain a thorough understand of grounding, the history, and basic methods for protective grounding (1.3.11, 1.4.1)
11. Apply an understanding of transporting and setting poles based off of the APPA safety manual guidelines (1.4.2, 1.4.3)
12. Demonstrate an understanding of de-energizing lines and equipment for employee protection (1.4.6)
13. Demonstrate an understanding of the replacement and installation of fuses (1.4.7)
14. Obtain a working knowledge of electricity, magnetism, and resistance and how they can be applied to work (1.4.8, 1.4.9, 1.4.10)

Course Number and Name: **ULT 2034 Line worker Registered Apprenticeship 3**

Description: A registered apprenticeship program between industry and education and is designed to integrate the student's technical studies with industrial experience

Hour Breakdown:

Semester Credit Hours	Lecture	Lab
4	4	0

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. 750 OJT hours is required as part of the Registered Apprenticeship.
2. Obtain an understanding of the necessity and procedures for first aid in various capacities and circumstances (1.5.1, 1.5.9, 1.6.1, 1.6.2, 1.6.6, 1.6.10)
3. Demonstrate and apply an understanding of mathematics in the workplace, to include proportion and ratio (1.5.2)
4. Obtain a working knowledge of transformers (1.5.3)
5. Demonstrate an understanding of the function and limitations of fused cutouts (1.5.4)
6. Demonstrate an understanding of the tools and equipment required for use in the workplace, to include: loadbusters, anchors, guys, rigging (1.5.5, 1.5.7, 1.5.8, 1.6.11)
7. Demonstrate a thorough knowledge of the installation and operation of the different types of arresters and conductors within the system (1.5.6, 1.6.3)
8. Demonstrate an understanding of regulators and the proper procedure for placing them in or out of service (1.6.4)
9. Obtain a basic knowledge of tree trimming as it pertains to providing adequate clearance and least amount of damage to trees (1.6.5)
10. Obtain a working knowledge of hand signals used during working conditions (1.6.7)
11. Demonstrate a working knowledge the principles of electricity (1.6.8)
12. Obtain a working knowledge and maintenance of series circuits (1.6.12, 1.6.13)

Course Number and Name: **ULT 2044 Line worker Registered Apprenticeship 4**

Description: A registered apprenticeship program between industry and education and is designed to integrate the student's technical studies with industrial experience

Hour Breakdown:

Semester Credit Hours	Lecture	Lab
4	4	0

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. 750 OJT hours is required as part of the Registered Apprenticeship.
2. Obtain a working knowledge of voltage drops in relation to electrical conductors (2.1.1)
3. Obtain a working knowledge of the principles of generation of electricity in order to understand the operation of the carious electrical apparatus (1.2.1)
4. Demonstrate the use of protective equipment to include its application and care (2.1.3)
5. Discuss the four basic meters to obtain a thorough understanding of how they work (2.1.4)
6. Demonstrate an understanding of the operation of distribution equipment (2.1.5)
7. Discuss the principles of transformers and their uses (2.1.6)
8. Demonstrate an understanding of a three phase system and the voltage relationships (2.1.7)
9. Discuss the installation and maintenance of street lights (2.1.8)
10. Discuss lightning and surge protection in relation to overhead and underground systems (2.1.9)
11. Discuss the delta system, the wye system and the voltage and current relationships of these two systems (2.2.3)
12. Obtain a working knowledge of electrical drawing symbols used in the industry (2.2.4)
13. Discuss inductance from electromotive force through the mutual induction of alternating transformers as it related to alternating current circuits (2.2.5)
14. Discuss electric shock and the two basic artificial respiration methods (2.2.6)
15. Obtain a working knowledge of parallel and series circuiting in locating voltages and currents (2.2.7)
16. Demonstrate and apply an understanding of mathematics in the workplace, to include: exponents, square root, and radius, diameter, and circumference of a circle (2.2.1, 2.2.2, 2.2.8)

Course Number and Name: **ULT 2053 Line worker Registered Apprenticeship 5**

Description: A registered apprenticeship program between industry and education and is designed to integrate the student's technical studies with industrial experience

Hour Breakdown:

Semester Credit Hours	Lecture	Lab
3	3	0

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. 750 OJT hours is required as part of the Registered Apprenticeship.
2. Discuss and obtain an understanding of transformer connections, oil reclosers, sectionlizers, capacitors and their uses and functions (2.3.1, 2.3.2, 2.3.3, 2.3.6)
3. Obtain a working knowledge of the inductance-power factors and service factors (2.3.4, 2.4.8)
4. Obtain an understanding of the necessity and procedures for first aid in various capacities and circumstances (2.3.5)
5. Discuss the use and limitations of bucket trucks, motor vehicles, and handling poles (2.3.7, 2.3.9, 2.4.3)
6. Obtain a working knowledge of vectors and the phase relationships between voltage and current in different circuits (2.3.8)
7. Obtain a working knowledge of inductance (2.3.10)
8. Develop and demonstrate proper care and safety habits of PPE and working in high traffic areas (2.4.1, 2.4.4)
9. Demonstrate an understanding of proper grounding of all portable electrical tools and equipment (2.4.2)
10. Obtain a working knowledge of the circuit ground and ground rod (2.4.6)
11. Demonstrate and apply an understanding of mathematics in the workplace, to include symbols, triangles (2.4.5, 2.4.7
12. Demonstrate a basic understanding of fault currents (2.4.9)

Course Number and Name: **ULT 2063 Line worker Registered Apprenticeship 6**

Description: A registered apprenticeship program between industry and education and is designed to integrate the student's technical studies with industrial experience

Hour Breakdown:

Semester Credit Hours	Lecture	Lab
3	3	0

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. 750 OJT hours is required as part of the Registered Apprenticeship.
2. Discuss the purpose and operation of the various types of sectionalizing switches in a distribution system (2.5.1)
3. Discuss circuit outages and their different causes (2.5.2)
4. Discuss the installation and removal of capacitors, controls, and related devices (2.5.3)
5. Obtain a working knowledge of metering equipment (2.5.4, 2.5.5)
6. Demonstrate an understanding of switches and oil circuit breakers at it relates to overcurrent protective devices and control equipment (2.5.6)
7. Demonstrate an understanding of the proper phase sequence of a circuit (2.5.7)
8. Demonstrate an understanding of proper planning and procedures of the stringing of O.H. distribution and transmission circuits (2.6.1, 2.6.2)
9. Demonstrate an understanding of sagging and tensioning wire (2.6.3)
10. Obtain a basic understanding of DC motors and their operation (2.6.4)
11. Demonstrate an understanding of URD circuits (2.6.5)
12. Demonstrate an understanding of a three phrase transformer bank (2.6.6)
13. Obtain a working knowledge of backfeed (2.6.7)
14. Demonstrate an understanding of the Safety Policies and Procedures as outlined in the Safety Manual and in OSHA guidelines (2.6.8)

Course Number and Name: **ULT 2073 Line worker Registered Apprenticeship 7**

Description: A registered apprenticeship program between industry and education and is designed to integrate the student's technical studies with industrial experience

Hour Breakdown:

Semester Credit Hours	Lecture	Lab
3	3	0

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. 750 OJT hours is required as part of the Registered Apprenticeship.
2. Obtain a working knowledge of a two-way radio (3.1.1)
3. Demonstrate an understanding of ground resistance (3.1.2)
4. Obtain a basic understanding of AC motors and circuits (3.1.3, 3.1.9)
5. Demonstrate an understanding of the installation of cables in duct systems (3.1.4)
6. Obtain a working knowledge of step-voltage regulators (3.1.5)
7. Demonstrate an understanding of overhead circuit faults and fault locating equipment (3.1.6, 3.1.7)
8. Demonstrate an understanding of the theory dealing with capacitance in AC circuits (3.1.8)
9. Demonstrate verbal and written workplace communication skills (3.2.1)
10. Obtain a working knowledge of the various differences and similarities of System Connections (3.2.2)
11. Discuss RL and RC resistance and inductance within series and parallel circuits (3.2.3, 3.2.4, 3.2.7, 3.2.8)
12. Obtain a working knowledge of power (true power, apparent power, and the power factor) (3.2.5)
13. Demonstrate an understanding of the uses and need for personal protective equipment (3.2.6)
14. Demonstrate a working knowledge of mathematics of AC circuits using the rules of sine, cosine, and tangent (3.2.9)
15. Discuss and obtain a working knowledge of underground residential distribution (3.2.10)
16. Obtain a thorough understanding of capacitors as it relates to power factor correction and voltage improvement (3.2.11)

Course Number and Name: **ULT 2083 Line worker Registered Apprenticeship 8**

Description: A registered apprenticeship program between industry and education and is designed to integrate the student's technical studies with industrial experience.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab
3	3	0

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. 750 OJT hours is required as part of the Registered Apprenticeship.
2. Discuss manhole systems in order to obtain a working knowledge of the basic components of an underground distribution system (3.3.1)
3. Obtain a basic understanding of the limitations and uses of various types of cables and cable systems (3.3.2, 3.3.3, 3.3.6, 3.3.7)
4. Demonstrate an understanding and the importance of the pre-job conference (3.3.8)
5. Demonstrate an understanding of the foreman and their job related duties and responsibility (3.3.9)
6. Obtain a working knowledge of taking a line out of service (3.4.1)
7. Obtain a working knowledge of aerial lift equipment (3.4.2)
8. Demonstrate an understanding of the installation and adjustment of air break switches (3.4.3)
9. Discuss vegetation management as it pertains to right-of-way ground clearance as well as line clearance issues (3.4.4)
10. Demonstrate how a phase sequence indicator works, how to use it, and when it is used (3.4.5)
11. Obtain a working knowledge of connecting and disconnecting capacitors
12. Develop a working knowledge of step regulators, tap changing transformers, three-phases padmounted transformers, and padmouted switchgear (3.3.4, 3.3.5, 3.8.7)

Course Number and Name: **ULT 2093 Line worker Capstone**

Description: A registered apprenticeship program between industry and education and is designed to integrate the student's technical studies with industrial experience

Hour Breakdown:

Semester Credit Hours	Lecture	Lab
3	3	0

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. 2000 OJT hours is required as part of the Registered Apprenticeship.
2. Develop an understanding of oil circuit breakers and transformer oil (3.5.1, 3.6.5)
3. Discuss and understanding manhole construction and on-the-job encounters of such (3.5.2)
4. Develop a working knowledge of the different types of meters (3.5.3, 3.6.6.)
5. Discuss the operating principles of reclosers and sectionalizers and the differences between them (3.5.4)
6. Demonstrate a working knowledge of the benefits and processes of safety meetings (3.5.5)
7. Obtain a working knowledge of voltage regulators (3.5.6)
8. Demonstrate a working knowledge of the overload capabilities of electrical equipment (3.5.7)
9. Discuss components of primary metering and their function as a unit (3.5.8)
10. Develop a basic understanding of AC generation and the principles which make them work (3.5.9)
11. Demonstrate a working knowledge of live line maintenance processes (3.6.1)
12. Develop an understanding of primary fusing and their different size and types and when to use them (3.6.2)
13. Obtain a working knowledge of the proper procedures for pole top rescue (3.6.3)
14. Develop a basic understanding of the principles of tying regulated circuits together (3.6.4)

APPENDIX A RECOMMENDED TOOLS AND EQUIPMENT

Capitalized Items

1. Bucket truck
2. Trailer/Truck required for CDL Class A License
3. Utility truck with derrick (2)
4. Others items as deemed appropriate by industry partners in a community college district.

Non-Capitalized Items

1. Hole Digger *(3)
2. Tamp-Wood*(2)
3. Tamp-Metal*(1)
4. Rock Bar* (1)
5. Chain Hoist (1-1/2 TON COFFING)* (1)
6. Chain Hoist (1-TON) *(1)
7. Strap Hoist* (2)
8. 14-ft Pike Poles*
9. 12-ft Pike Poles*
10. Nylon Slings*(1)
11. Pulling Grip (may need wire grip and guy grip depends on the type bought)*(10)
12. 18-ft Bolt Cutter
13. 36-ft BOLT CUTTERS* (1 per student)
14. Cant Hook* (1)
15. Shovel-Round Nose* (1 per student)
16. Transformer Gin (1)
17. Bit-Wood 11/16*(2)
18. Bit Wood 13/16*(2)
19. GAFF Maintenance Kit (1)
20. Ground Rod Driver* (1)
21. Pulling Eye* (1)
22. Hand Line Hook* (6)
23. Hand Line Block* (6)
24. Hand Line Snap* (6)
25. Hand Line Rope 600 ft *
26. Guy Wire Dispenser
27. Bit Brace* (3)
28. Body Belt (1 per student)
29. Safety Strap (1 per student)
30. Tool Pouch (1 per student)
31. Nut and Bolt Bag (1 per student)
32. Climbers (1 pair per student)
33. Top Straps (1 pair per student)
34. Top Pads (1 pair per student)
35. Gutt Strap (1 per student)
36. Tool Bag (1 per student)
37. Gaff Guards (1 per student)
38. Body Harness (1 per student)
39. 18-in. Lanyard (1 per student)
40. Orange barrels, plastic (10)
41. Orange traffic cones, 18 in., plastic (50)
42. Others items as deemed appropriate by industry partners in a community college district.

RECOMMENDED INSTRUCTIONAL AIDS

It is recommended that instructors have access to the following items:

1. Computer with operating software with multimedia kit (1)
2. Data projector (1)
3. Interactive display board (1)
4. Laptop computer (1)
5. Printer (1)
6. Projector, overhead (1)
7. DVD (1)

Fall Arrest System

1. BUCKINGHAM BEAM (5203)*
2. BUCKINGHAM LIFE LINE (5201-50)*
3. ROPE GRAB (3/4)*
4. 100% fall safety

* Will depend on number of students

Tools Students Will Need (one per student)

1. 9-in. KLEIN SIDE CUT PLIERS
2. 12-in. CREASENT WRENCH
3. SCREWDRIVER
4. CHANNLOCK PLIERS
5. RULER
6. BALL-PEEN HAMMER
7. HARD HAT
8. SAFETY GLASSES
9. WORK GLOVE
10. Others items as deemed appropriate by industry partners in a community college district.

APPENDIX B CURRICULUM DEFINITIONS AND TERMS

- Course Name – A common name that will be used by all community colleges in reporting students

- Course Abbreviation – A common abbreviation that will be used by all community and junior colleges in reporting students

- Classification – Courses may be classified as the following:
    - Career Certificate Required Course – A required course for all students completing a career certificate.

Technical Certificate Required Course – A required course for all students completing a technical certificate.

    - Technical Elective – Elective courses that are available for colleges to offer to students.

- Description – A short narrative that includes the major purpose(s) of the course

- Prerequisites – A listing of any courses that must be taken prior to or on enrollment in the course

- Corequisites – A listing of courses that may be taken while enrolled in the course

- Student Learning Outcomes – A listing of the student outcomes (major concepts and performances) that will enable students to demonstrate mastery of these competencies

The following guidelines were used in developing the program(s) in this document and should be considered in compiling and revising course syllabi and daily lesson plans at the local level:

- The content of the courses in this document reflects approximately 75% of the time allocated to each course. The remaining 25% of each course should be developed at the local district level and may reflect the following:
    - Additional competencies and objectives within the course related to topics not found in the state framework, including activities related to specific needs of industries in the community college district
    - Activities that develop a higher level of mastery on the existing competencies and suggested objectives
    - Activities and instruction related to new technologies and concepts that were not prevalent at the time the current framework was developed or revised
    - Activities that include integration of academic and career–technical skills and course work, school-to-work transition activities, and articulation of secondary and postsecondary career–technical programs
    - Individualized learning activities, including work-site learning activities, to better prepare individuals in the courses for their chosen occupational areas

- Sequencing of the course within a program is left to the discretion of the local college. Naturally, foundation courses related to topics such as safety, tool and equipment usage, and other fundamental skills should be taught first. Other courses related to specific skill areas and related academics, however, may be sequenced to take advantage of seasonal and climatic conditions, resources located outside of the school, and other factors. Program must include a minimum of 15 semester hours of General Education Core Courses. The courses in the General Education Core may be spaced out over the entire length of the program so that students complete some academic and Career Technical courses each semester. Each community college specifies the actual courses that are required to meet the General Education Core Requirements for the Associate of Applied Science Degree at their college.

- In order to provide flexibility within the districts, individual courses within a framework may be customized by doing the following:

    - Adding new student learning outcomes to complement the existing competencies and suggested objectives in the program framework
    - Revising or extending the student learning outcomes
    - Adjusting the semester credit hours of a course to be up 1 hour or down 1 hour (after informing the Mississippi Community College Board [MCCB] of the change)

APPENDIX C: RECOMMENDED TEXTBOOK LIST

Recommended Utility Lineman Text Book List CIP: 43.0303 - Utility Lineman		
Book Title	**Author (s)**	**ISBN**
Safety Manual Promoting a safe and injury free work environment for public power	American Public Association	
The Lineman's and Cableman's Handbook	Thomas M. Shoemaker James E. Mack	978-0-07-174258-0
The Guidebook for Linemen & Cablemen 2nd Edition	Wayne Van Soelen	13:978-1-1110-3501-3
NESC Handbook		10:1259584151
Power Lineworker		10:0132571099
NCCER CORE	NCCER	
NCCER Level 1 Lineman	NCCER	

APPENDIX D: COURSE CROSSWALK

Course Crosswalk Utility Lineman (CIP: 43.0303)					
Note: Courses that have been added or changed in the 2018 curriculum are highlighted.					
Existing			**Revised**		
2011 MS Curriculum Framework			**2018 MS Curriculum Framework**		
Course Number	**Course Title**	**Hours**	**Course Number**	**Course Title**	**Hours**
AEL 1118	Electric Lineman I	8	ULT 1118	Electric Lineman I	8
AEL 1123	Electric Lineman II	8	ULT 1128	Electric Lineman II	8
ULT 1122	Line Worker Safety	2	ULT 1122	Line Worker Safety	2
ULT 1133	Safety for Line Workers	3	ULT 1133	Safety for Line Workers	3
ULT 1152	AC and DC Circuits for Line Workers	2	ULT 1152	AC and DC Circuits for Line Workers	
ULT 1192 **OR** ELT 1192	Fundamentals of Electricity for Lineworkers **OR** Fundamentals of Electricity	2	ULT 1192	Fundamentals of Electricity for Lineworkers	2
ULT 1213	Electric Power	3	ULT 1213	Electric Power	3
ULT 1313 **OR** ULT 1324 **OR** DTV 1114	Line Worker Truck Driving **OR** Truck Driving Line Workers **OR** Commercial Truck Driving	**3 OR 4**	ULT 1313 **OR** ULT 1324 **OR** DTV 1114	Line Worker Truck Driving **OR** Truck Driving Line Workers **OR** Commercial Truck Driving	**3 OR 4**
ULT 1333	Basic Utility Equipment Operations	**3**	ULT 1333	Basic Utility Equipment Operations	**3**
ULT 1413	Pole Climbing	3	ULT 1413	Pole Climbing	3
ULT 1514	Overhead, Underground, and Substation Construction	4	ULT 1514	Overhead, Underground, and Substation Construction	4
ULT 1144 **OR** ELT 1144	AC and DC Circuits for Line Workers **OR** AC and DC Circuits for Electrical Technology	4	ULT 1144	AC and DC Circuits for Line Workers	4
ULT 1413	Pole Climbing	3	ULT 1413	Pole Climbing	3
ULT 1514	Overhead, Underground, and Substation Construction	4	ULT 1514	Overhead, Underground, and Substation Construction	4
ULT 1523	National Electrical Safety Code	**3**	ULT 1523	National Electrical Safety Code	**3**
ULT 2133	Overhead Construction	3	ULT 2133	Overhead Construction	3
ULT 2143 ULT 2233	Underground Construction System Design and Operation	3 3	ULT 2143 ULT 2233	Underground Construction System Design and Operation	3 3
ULT 2244	Working in Elevated Work Sites	4	ULT 2244	Working in Elevated Work Sites	4