2011 Mississippi Curriculum Framework

Postsecondary Utility Line Worker Technology

(Program CIP: 43.0303)

Direct inquiries to

LaNell Kellum, PhD
Director for Career and Technical Education
Mississippi Community College Board
3825 Ridgewood Road
Jackson, MS 39211
601.432.6518
lkellum@mccb.edu

Doug Ferguson
Instructional Design Specialist
Research and Curriculum Unit
P.O. Drawer DX
Mississippi State, MS 39762
662.325.2510
doug.ferguson@rcu.msstate.edu

Published by

Office of Career and Technical Education
Mississippi Department of Education
Jackson, MS 39205

Research and Curriculum Unit
Mississippi State University
Mississippi State, MS 39762

Acknowledgments

Writing Team

Joanna Alford, East Mississippi Community College
Susan Anderson, Pearl River Community College
Rodney Beech, Pearl River Community College
Dean Belton, Mississippi Gulf Coast Community College
Randy Henry, Pearl River Community College
Bob Lovelace, East Mississippi Community College
Doyle Perkins, East Mississippi Community College
Mike Stringer, East Mississippi Community College
Ronald Wright, East Mississippi Community College

RCU Staff

Doug Ferguson, Instructional Design Specialist, Author
Jo Ann Watts, Instructional Design Specialist, Author
Theresa Wheeler, Research Specialist, Author
Ashleigh Barbee Murdock, Editor

Professional Curriculum Advisory Team

Standards in this document are based on information from the following organizations:

Standards for Electric Power Generation, Distribution, and Transmission Industry Construction

Reproduced with permission of the United States Department of Labor Occupational Safety and Health Administration, copyright © 2008, Occupational Safety & Health Administration, 200 Constitution Avenue, NW Washington, DC 20210, http://www.osha.gov Permission does not constitute an endorsement by OSHA.

Related Academic Standards

CTB/McGraw-Hill LLC. (2005). *Tests of adult basic education, Forms 9 and 10.* Monterey, CA: Author. Reproduced with permission of CTB/McGraw-Hill LLC. TABE is a registered trademark of The McGraw-Hill Companies, Inc. Copyright © 2005 by CTB/McGraw-Hill LLC. Reproduction of this material is permitted for educational purposes only.

21st Century Skills

Reproduced with permission of the Partnership for 21st Century Skills. Further information may be found at www.21stcenturyskills.org.

Preface

Research Synopsis

Articles, books, Web sites, and other materials listed at the end of each course were considered during the revision process. The *Mississippi Power Company and the Electric Power Association of Mississippi* was especially useful in providing insight into trends and issues in the field. These references are suggested for use by instructors and students during the study of the topics outlined.

Industry advisory team members from colleges throughout the state were asked to give input related to changes to be made to the curriculum framework. Instructors from colleges throughout the state were also asked to give input on changes to be made to the curriculum framework.

Needs of the Future Workforce

Utility linemen repair and install power lines. There were over 112 thousand utility linemen employed in the United States in 2001. The occupation is projected to grow about as fast as average in the United States, 10%, in the United States, and slower than average, 6%, in Mississippi. However, job prospects will be good due to replacement jobs because an increasing portion of the electrical power industry is approaching retirement age (US Bureau of Labor Statistics, 2010).

Utility Line Worker Technology Employment Projections and Earnings

Region	2010 Jobs	2020 Jobs	Change	% Change	Openings	2010 Median Hourly Earnings
Regional Total	1,947	2,067	120	6%	914	$22.38
National Total	112,751	123,984	11,233	10%	57,081	$26.84

Assessment

Students will be assessed using the Utility Lineman Technology MS-CPAS2 test. The MS-CPAS2 blueprint can be found at http://www.rcu.msstate.edu/. All students will test after year one of their program. A second test covering the second year material will be administered to AAS track students upon completion of their program. If there are questions regarding assessment of this program, please contact the STEM Instructional Design Specialist at the Research and Curriculum Unit at 662.325.2510.

There is no alternate assessment at this time.

Best Practices

Teachers are expected to use a wide variety of teaching strategies throughout the curriculum to instruct competencies in various methods. Teachers should develop strategies that reflect academic achievement, problem solving, and industry needs for daily use in the classroom.

Professional Learning
It is suggested that instructors participate in professional learning related to the following concepts:

- How to use the program Blackboard site
- Differentiated instruction – To learn more about differentiated instruction, please go to http://www.paec.org/teacher2teacher/additional_subjects.html, and click on Differentiated Instruction. Work through this online course, and review the additional resources.

Program Exceptions
There are no program exceptions at this time.

Professional Organizations
Student and professional organizations encourage networking and provide further understanding of the skills, standards, and expectations of graphic designers.

Articulation
There are no articulation agreements for this program.

Foreword

As the world economy continues to evolve, businesses and industries must adopt new practices and processes in order to survive. Quality and cost control, work teams and participatory management, and an infusion of technology are transforming the way people work and do business. Employees are now expected to read, write, and communicate effectively; think creatively, solve problems, and make decisions; and interact with each other and the technologies in the workplace. Career–technical programs must also adopt these practices in order to provide graduates who can enter and advance in the changing work world.

The curriculum framework in this document reflects these changes in the workplace and a number of other factors that impact local career–technical programs. Federal and state legislation calls for articulation between high school and community college programs, integration of academic and career skills, and the development of sequential courses of study that provide students with the optimum educational path for achieving successful employment. National skills standards, developed by industry groups and sponsored by the U.S. Department of Education and Labor, provide career and technical educators with the expectations of employers across the United States. All of these factors are reflected in the framework found in this document.

Referenced throughout the courses of the curriculum are the 21st Century Skills, which were developed by the Partnership for 21st Century Skills, a group of business and education organizations concerned about the gap between the knowledge and skills learned in school and those needed in communities and the workplace. A portion of the 21st Century Skills addresses learning skills needed in the 21st century, including information and communication skills, thinking and problem-solving skills, and interpersonal and self-directional skills. Another important aspect of learning and working in the 21st century involves technology skills. The International Society for Technology in Education, developer of the National Educational Technology Standards (NETS), was a strategic partner in the Partnership for 21st Century Skills.

Each postsecondary program of instruction consists of a program description and a suggested sequence of courses that focus on the development of occupational competencies. The MS-CPAS2 blueprints are based upon the suggested course sequences to allow for year 1 and year 2 assessments for all exit options. Please refer to the blueprint online. Each career–technical course in this sequence has been written using a common format, which includes the following components:

- Course Name – A common name that will be used by all community and junior 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–technical core – A required career–technical course for all students
    - Area of concentration (AOC) core – A course required in an area of concentration of a cluster of programs
    - Career–technical elective – An elective career–technical course
    - Related academic course – An academic course that provides academic skills and knowledge directly related to the program area

  - Academic core – An academic course that is required as part of the requirements for an associate's degree

- Description – A short narrative that includes the major purpose(s) of the course and the recommended number of hours of lecture and laboratory activities to be conducted each week during a regular semester

- 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

- Competencies and Suggested Objectives – A listing of the competencies (major concepts and performances) and the suggested student objectives 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 district. 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.

- Programs that offer an Associate of Applied Science degree must include a minimum 15-semester-credit-hour academic core. Specific courses to be taken within this core are to be determined by the local district. Minimum academic core courses are as follows:
  - 3 semester credit hours (sch) Math/Science Elective
  - 3 semester credit hours Written Communications Elective
  - 3 semester credit hours Oral Communications Elective
  - 3 semester credit hours Humanities/Fine Arts Elective

- 3 semester credit hours Social/Behavioral Science Elective

It is recommended that courses in the academic core be spaced out over the entire length of the program, so that students complete some academic and career–technical courses each semester. Each community or junior college has the discretion to select the actual courses that are required to meet this academic core requirement.

- Career–technical elective courses have been included to allow community colleges and students to customize programs to meet the needs of industries and employers in their area.

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

- Adding new competencies and suggested objectives
- Revising or extending the suggested objectives for individual competencies
- 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)

In addition, the curriculum framework as a whole may be customized by doing the following:

- Resequencing courses within the suggested course sequence reflecting the new assessment format
- Developing and adding a new course that meets specific needs of industries and other clients in the community or junior college district (with MCCB approval)
- Utilizing the career technical elective options in many of the curricula to customize programs

Table of Contents

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.

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*
16-Week Line Worker Certificate

2 sch Line Worker Safety (ULT 1122)
2 sch Fundamentals of Electricity for Lineworkers (ULT 1192) or Fundamentals of Electricity (ELT 1192)
2 sch AC and DC Circuits for Line Workers (ULT 1144) or AC and DC Circuits for Electrical Technology (ELT 1144) **
3 sch Pole Climbing (ULT 1413)
3 sch Line Worker Truck Driving (ULT 1313) or Truck Driving for Line Workers (ULT 1324) or Commercial Truck Driving I (DTV 1114)
4 sch Overhead, Underground, and Substation Construction (ULT 1514)
3 sch Elective***
2 sch Elective***

_____
21 sch (Minimum Required)

* Students who lack entry-level skills in math, English, science, and so forth will be provided related studies.

** DC Circuits (EET 1114) **AND** AC Circuits (EET 1123) may be taken instead of AC and DC Circuits for Electrical Technology (ELT 1144) **AND** may be used as a 3-hr elective.

*** APPROVED ELECTIVES

Basic Technical Math (TMA 1023)
Interpersonal Skills for line Worker (ULT 1112)
Electrical Power (ELT 1213)
Electrical Power (ULT 1213)
Transformer Operation and Banking (ULT 1223)
Electric Power and Transformer Banking for Lineworkers (ULT 1232)
Basic Utility Equipment Operation (ULT 1333)
National Electrical Safety Code (ULT1523)
Fundamentals of Geographical Information Systems (GIS) (GIT 2123)
System Design and Operation (ULT 2233)
Working in Elevated Worksites (ULT 2244)
Advanced Utility Equipment Operation (ULT 2333)
Special Projects I, II, and III (ULT 291(1–3), ULT 292(1-3), ULT 293(1–3))
Work-Based Learning I, II, III, IV, V, and VI [(WBL 191(1–3), WBL 192(1–3), WBL 193(1–3), WBL 291(1–3), WBL 292(1–3), WBL 293(1–3)]
Seminar and Planning CTE 200(1-6)
Supervised Work Experience I, II [ULT 294(1–3), ULT 295(1–3)]
Any other technical or academic course **as approved by the instructor**

† COMPUTER RELATED ELECTIVE

Computer Fundamentals for Line Workers (ULT 1612)

Computer Fundamentals for Electronics/Electrical (EET 1613) †
Fundamentals of Microcomputer Applications (CPT 1113) †
Introduction to Computer Concepts (CSC 1113) †
Any other computer related technical or academic course as approved by the instructor

Suggested Course Sequence*
Utility Lineman Technology

Associate of Applied Science

FIRST YEAR

3 sch	Safety for Line Workers (ULT 1133)	3 sch	Overhead Construction (ULT 2133)
2 sch	Fundamentals of Electricity for Lineworkers (ULT 1192) or Fundamentals of Electricity (ELT 1192)	3 sch	Underground Construction (ULT 2143)
3 sch	National Electrical Safety Code (ULT 1523)	3 sch	Basic Utility Equipment Operations (ULT 1333)
4 sch	AC and DC Circuits for Lineworker Technology (ULT 1144)	3 sch	Approved Technical Elective**
3 sch	Pole Climbing (ULT 1413)	3 sch	Approved Technical Elective**
4 sch	Truck Driving for Line Workers (ULT 1324) or Commercial Truck Driving (DTV 1114)	3 sch	Approved Technical Elective**
19 sch		18 sch	

SECOND YEAR

3 sch	System Design and Operation (ULT 2233)	3 sch	Oral Communication Elective
4 sch	Working in Elevated Work Sites (ULT 2244)	3 sch	Humanities/Fine Arts Elective
3 sch	Computer Application Elective†	3 sch	Written Communication Elective
3 sch	Approved Technical Elective**	3 sch	Math/Science Elective
		3 sch	Social/Behavioral Science Elective
13 sch		15 sch	

* Students who lack entry-level skills in math, English, science, and so forth will be provided related studies.

** APPROVED TECHNICAL ELECTIVES

Interpersonal Skills for line Worker (ULT 1112)
Electrical Power (ELT 1213)
Electrical Power (ULT 1213)
Transformer Operation and Banking (ULT 1223)
Advanced Utility Equipment Operation (ULT 2333)
Special Projects I, II, and III (ULT 291(1–3), ULT 292(1-3), ULT 293(1–3))

Work-Based Learning I, II, III, IV, V, and VI [(WBL 191(1–3), WBL 192(1–3), WBL 193(1–3), WBL 291(1–3), WBL 292(1–3), WBL 293(1–3)]
Seminar and Planning CTE 200(1-6)
Supervised Work Experience I, II [ULT 294(1–3), ULT 295(1–3)]
Any other technical or academic course as approved by the instructor.

† COMPUTER RELATED ELECTIVE

Lineworkers Computer Fundamentals (ULT 1623)
Computer Fundamentals for Electronics/Electrical (EET 1613) †
Fundamentals of Microcomputer Applications (CPT 1113) †
Introduction to Computer Concepts (CSC 1113) †
Fundamentals of Geographical Information Systems (GIS) (GIT 2123) †
Any other computer related technical or academic course as approved by the instructor.

Course Name: Interpersonal Skills for Line Workers

Course Abbreviation: ULT 1112

Classification: Career- AAS Elective

Description: This course is designed to cover the basic communication skills for interaction with others. (2 sch: 2-hr lecture)

Prerequisite: None

Competencies and Suggested Objectives
1. Discuss customer service. (DOK1, COM, EMP)
2. Discuss listening skills. (DOK1, COM, EMP)
3. Discuss communications. (DOK1, COM, EMP)

STANDARDS

CONTREN CORE

COM Basic Communication Skills (Module 00107-09)
EMP Basic Employability Skills (Module 00108-09)

Related Academic Standards

R1 Interpret Graphic Information (forms, maps, reference sources)
R2 Words in Context (same and opposite meaning)
R3 Recall Information (details, sequence)
R4 Construct Meaning (main idea, summary/paraphrase, compare/contrast, cause/effect)
R5 Evaluate/Extend Meaning (fact/opinion, predict outcomes, point of view)
M1 Addition of Whole Numbers (no regrouping, regrouping)
M2 Subtraction of Whole Numbers (no regrouping, regrouping)
M3 Multiplication of Whole Numbers (no regrouping, regrouping)
M4 Division of Whole Numbers (no remainder, remainder)
M5 Decimals (addition, subtraction, multiplication, division)
M6 Fractions (addition, subtraction, multiplication, division)
M7 Integers (addition, subtraction, multiplication, division)
M8 Percents
M9 Algebraic Operations
A1 Numeration (ordering, place value, scientific notation)
A2 Number Theory (ratio, proportion)
A3 Data Interpretation (graph, table, chart, diagram)
A4 Pre-Algebra and Algebra (equations, inequality)
A5 Measurement (money, time, temperature, length, area, volume)
A6 Geometry (angles, Pythagorean theory)

A7 Computation in Context (whole numbers, decimals, fractions, algebraic operations)
A8 Estimation (rounding, estimation)
L1 Usage (pronoun, tense, subject/verb agreement, adjective, adverb)
L2 Sentence Formation (fragments, run-on, clarity)
L3 Paragraph Development (topic sentence, supporting sentence, sequence)
L4 Capitalization (proper noun, titles)
L5 Punctuation (comma, semicolon)
L6 Writing Conventions (quotation marks, apostrophe, parts of a letter)
S1 Vowel (short, long)
S2 Consonant (variant spelling, silent letter)
S3 Structural Unit (root, suffix)

21st Century Skills

CS1 Global Awareness
CS2 Financial, Economic, Business and Entrepreneurial Literacy
CS3 Civic Literacy
CS7 Critical Thinking and Problem Solving
CS8 Information and Communication Skills
CS9 Information Literacy
CS13 Initiative and Self-Direction

SUGGESTED REFERENCES

Books

Burkart, M., McCann, M., & Paine, D. (2004). *Elevated work platforms and scaffolding*. New York, NY: McGraw-Hill Professional.

Carman, R. A., & Saunders, H. M. (2005). *Mathematics for the trades: A guided approach*. Upper Saddle River, NJ: Pearson Prentice Hall.

Cook, N. P. (2004). *Introductory mathematics*. Upper Saddle River, NJ: Pearson Prentice Hall.

Cook, N. P. (2004). *Mathematics for technical trades*. Upper Saddle River, NJ: Pearson Prentice Hall.

Harman, T. L. (2005). *Guide to the national electric code*. Upper Saddle River, NJ: Prentice Hall.

Hart, G. V. (2008). *Ugly's electrical references*. Houston, TX: Jones Bartlett Publishers.

Henry, T. (n.d.). *Dictionary for the electrician with formulas*. Winter Park, FL: Henry Publications.

Herman, S. L. (2007). *Alternating current fundamentals*. Florence, KY: Cengage Delmar Learning, Inc.

Herman, S. L. (2009). *Delmar's standard textbook of electricity*. Florence, KY: Cengage Delmar Learning, Inc.

Keljik, J. (2009). *Electricity 3: Power generation and delivery*. Florence, KY: Cengage Delmar Learning, Inc.

Keljik, J. (2009). *Electricity 4: AC/DC motors, controls, and maintenance*. Florence, KY: Cengage Delmar Learning, Inc.

Kubala, T. (2009). *Electricity 1: Devices, circuits, and materials*. Florence, KY: Cengage Delmar Learning, Inc.

Kubala, T. (2009). *Electricity 2: Devices, circuits, and materials*. Florence, KY: Cengage Delmar Learning, Inc.

MacDonald, J., Rossnagel, W., & Higgins, L. (2009). *Handbook of rigging*. New York, NY: McGraw-Hill Professional.

Marne, D. (2006, October). *National electrical safety code (NESC) handbook 2007* (2nd ed.). New York, NY: McGraw-Hill Professional.

Mazur, G. A., & Zurlis, P. A. (2003). *Electrical principles and practices*. Homewood, IL: American Technical.

Mullin, R. C., & Smith, R. L. (2005). *Electrical wiring commercial*. Clifton Park, NY: Delmar.

National Center for Construction Education and Research. (2009). *Core curriculum*. Upper Saddle River, NJ: Pearson Prentice Hall.

National Fire Protection Association. (2005). *National electric code*. Clifton Park, NY: Delmar.

Rockis, G., & Mazur, G. (2001). *Electrical motor controls*. Homewood, IL: American Technical.

Shoemaker, T., & Mack, J. (2007). *The lineman's and cableman's handbook* (11th ed.). New York, NY: McGraw-Hill Professional.

Shoemaker, T., & Mack, J. (2009). *The lineman and cableman's field manual* (2nd ed.). New York, NY: McGraw-Hill Professional.

Surbrook, T., & Althouse, J. (2005). *Interpreting the national electric code*. Clifton Park, NY: Delmar.

Titus, P. A., Titus, J. L., & Traister, J. (2002). *Illustrated dictionary for electrical workers*. Albany, NY: Delmar.

Trout, C. (2002). *Electrical installation and inspection*. Albany, NY: Delmar.

VanSoelen, W. (2006). *The guide for linemen and cablemen*. Florence, KY: Cengage Delmar Learning, Inc.

VanSoelen, W. (2007). *The field guide for powerline workers*. Florence, KY: Cengage Delmar Learning, Inc.

Journals and Magazines

Blatt, M. (2009, November–December). Optical communications for improving the performance and reliability of the smart grid. *Electric Energy T&D Magazine, 6*(13). Retrieved December 14, 2009, from http://www.electricenergyonline.com/?page=show_article&mag=60&article=461

Boyle, J. (2009). Aerial lifts. TailGate Safety Topics. Retrieved December 14, 2009, from http://www.incident-prevention.com/component/zine/article/108-aerial-lifts.html

Coveney, M. (2009, November–December). Helping utilities attain sustainability through 'Green IT'. *Electric Energy T&D Magazine*, *6*(13). Retrieved December 14, 2009, from http://www.electricenergyonline.com/?page=show_article&mag=60&article=457

Shein, R. (2009, November–December). Security quality and smart grid: The utilities' dilemma. *Electric Energy T&D Magazine*, *6*(13). Retrieved December 14, 2009, from http://www.electricenergyonline.com/?page=show_article&mag=60&article=460

Web Sites

Blackboard Academic Suite. (n.d.). Retrieved November 11, 2009, from http://rcu.blackboard.com/webapps/portal/frameset.jsp

Electric Energy Online (2009). *Electric Energy Magazine*, Jaguar Media Inc., Terrebonne, Quebec Canada. Retrieved December 3, 2009, from http://www.electricenergyonline.com/?page=home

E-School News. (n.d.). Retrieved November 12, 2009, from http://www.eschoolnews.com/news/top-news/index.cfm?i=50758

How stuff works. (n.d.). Retrieved November 11, 2009, from http://www.howstuffworks.com/

Kathy Schrock's guide for educators. (n.d.). In discovery education. Retrieved November 11, 2009, from http://school.discoveryeducation.com/schrockguide/

OSHA Instruction. (2003). Enforcement of the electric power generation, transmission, and distribution standard. Retrieved on December 14, 2009, from http://www.osha.gov/OshDoc/Directive_pdf/CPL_2-1_38.pdf

OSHA Construction Regulations. (September, 2008). Retrieved December 3, 2009, from http://www.osha.gov/SLTC/powergeneration/construction.html

Spears, R. (2003). The ruler game. Retrieved on November 11, 2009, from http://www.rickyspears.com/rulergame/

Teacher Vision. (n.d.). Retrieved November 11, 2009, from http://www.teachervision.fen.com/

Tech Learning. (n.d.). Retrieved November 11, 2009, from http://techlearning.com

Vocational Information Center. (n.d.). About vocational education. In Career and technical–vocational education. Retrieved November 11, 2009, from http://www.khake.com/page50.html

Course Name: Line Worker Safety

Course Abbreviation: ULT 1122

Classification: Career Core

Description: This course is designed to provide fundamental safety rules and procedures needed in performing basic line worker skills. (2 sch: 2-hr lecture)

Prerequisite: None

Competencies and Suggested Objectives
1. Discuss OSHA standards 269. (DOK1, GTD, SED, SAF)
2. Provide approved CPR and first-aid training and certification. (DOK1, SED, SAF) a. Discuss transference and avoidance of blood-borne pathogens. (DOK1)
3. Demonstrate the proper use of personal protective equipment as prescribed by OSHA. (DOK1, RPS, SED, SHP, SRP, SFP, SAF)
4. Discuss job-site safety. (DOK1, GTD, SER, RPS, SED, SHP, LAD, SRP, SFP, MHE. RIG, SAF) a. Demonstrate safety procedures relating to chain saws. (DOK1) b. Discuss safety procedures relating to hydraulic tool operations. (DOK1) c. Discuss pole safety inspection procedures. (DOK1)
5. Discuss the importance of the proper handling of HazMat (Hazardous Materials) and MSDSs (Material Safety Data Sheets) as required by OSHA. (DOK1, RPS, SED, SRP, MHE, SAF)
6. Discuss/Demonstrate proper testing, grounding, and flagging. (DOK1, SER, RPS, SED, RIG, SAF)

STANDARDS

Code of Federal Regulation OSHA Standards

GTD Electric Power Generation, Transmission, and Distribution 1910.269
SER Specific excavation requirements 1926.651
RPS Requirements for protective systems 1926.652
SED Safety training and education 1926.21
SHP Head protection 1926.100
LAD Ladders 1926.1053
SRP Respiratory protection 1910.134
SFP Duty to have fall protection 1926.501
MHE Material handling equipment 1926.602
RIG Rigging equipment for material handling 1926.251
SAF General safety and health provisions 1926.20

Code of Federal Regulation OSHA Standards

GTD Electric Power Generation, Transmission, and Distribution 1910.269
SER Specific excavation requirements 1926.651

CONTREN Core

SAF Basic Safety (MODULE 00101-09)

Related Academic Standards

R1 Interpret Graphic Information (forms, maps, reference sources)
R2 Words in Context (same and opposite meaning)
R3 Recall Information (details, sequence)
R4 Construct Meaning (main idea, summary/paraphrase, compare/contrast, cause/effect)
R5 Evaluate/Extend Meaning (fact/opinion, predict outcomes, point of view)
M1 Addition of Whole Numbers (no regrouping, regrouping)
M2 Subtraction of Whole Numbers (no regrouping, regrouping)
M3 Multiplication of Whole Numbers (no regrouping, regrouping)
M4 Division of Whole Numbers (no remainder, remainder)
M5 Decimals (addition, subtraction, multiplication, division)
M6 Fractions (addition, subtraction, multiplication, division)
M7 Integers (addition, subtraction, multiplication, division)
M8 Percents
M9 Algebraic Operations
A1 Numeration (ordering, place value, scientific notation)
A2 Number Theory (ratio, proportion)
A3 Data Interpretation (graph, table, chart, diagram)
A4 Pre-Algebra and Algebra (equations, inequality)
A5 Measurement (money, time, temperature, length, area, volume)
A6 Geometry (angles, Pythagorean theory)
A7 Computation in Context (whole numbers, decimals, fractions, algebraic operations)
A8 Estimation (rounding, estimation)
L1 Usage (pronoun, tense, subject/verb agreement, adjective, adverb)
L2 Sentence Formation (fragments, run-on, clarity)
L3 Paragraph Development (topic sentence, supporting sentence, sequence)
L4 Capitalization (proper noun, titles)
L5 Punctuation (comma, semicolon)
L6 Writing Conventions (quotation marks, apostrophe, parts of a letter)
S1 Vowel (short, long)
S2 Consonant (variant spelling, silent letter)
S3 Structural Unit (root, suffix)

21st Century Skills

CS1 Global Awareness
CS2 Financial, Economic, Business and Entrepreneurial Literacy

CS3 Civic Literacy
CS7 Critical Thinking and Problem Solving
CS8 Information and Communication Skills
CS9 Information Literacy
CS13 Initiative and Self-Direction

SUGGESTED REFERENCES

Burkart, M., McCann, M., & Paine, D. (2004). *Elevated work platforms and scaffolding*. New York, NY: McGraw-Hill Professional.

Carman, R. A., & Saunders, H. M. (2005). *Mathematics for the trades: A guided approach*. Upper Saddle River, NJ: Pearson Prentice Hall.

Cook, N. P. (2004). *Introductory mathematics*. Upper Saddle River, NJ: Pearson Prentice Hall.

Cook, N. P. (2004). *Mathematics for technical trades*. Upper Saddle River, NJ: Pearson Prentice Hall.

Harman, T. L. (2005). *Guide to the National Electric Code*. Upper Saddle River, NJ: Prentice Hall.

Hart, G. V. (2008). *Ugly's electrical references*. Houston, TX: Jones Bartlett Publishers.

Henry, T. (n.d.). *Dictionary for the electrician with formulas*. Winter Park, FL: Henry Publications.

Herman, S. L. (2007). *Alternating current fundamentals*. Florence, KY: Cengage Delmar Learning, Inc.

Herman, S. L. (2009). *Delmar's standard textbook of electricity*. Florence, KY: Cengage Delmar Learning, Inc.

Keljik, J. (2009). *Electricity 3: Power generation and delivery*. Florence, KY: Cengage Delmar Learning, Inc.

Keljik, J. (2009). *Electricity 4: AC/DC motors, controls, and maintenance*. Florence, KY: Cengage Delmar Learning, Inc.

Kubala, T. (2009). *Electricity 1: Devices, circuits, and materials*. Florence, KY: Cengage Delmar Learning, Inc.

Kubala, T. (2009). *Electricity 2: Devices, circuits, and materials*. Florence, KY: Cengage Delmar Learning, Inc.

MacDonald, J., Rossnagel, W., & Higgins, L. (2009). *Handbook of rigging*. New York, NY: McGraw-Hill Professional.

Marne, D. (2006, October). *National electrical safety code (NESC) handbook 2007* (2nd ed.). New York, NY: McGraw-Hill Professional.

Mazur, G. A., & Zurlis, P. A. (2003). *Electrical principles and practices*. Homewood, IL: American Technical.

Mullin, R. C., & Smith, R. L. (2005). *Electrical wiring commercial*. Clifton Park, NY: Delmar.

National Center for Construction Education and Research. (2009). *Core curriculum*. Upper Saddle River, NJ: Pearson Prentice Hall.

National Fire Protection Association. (2005). *National electric code*. Clifton Park, NY: Delmar.

Rockis, G., & Mazur, G. (2001). *Electrical motor controls.* Homewood, IL: American Technical.

Shoemaker, T., & Mack, J. (2007). *The lineman's and cableman's handbook* (11th ed.). New York, NY: McGraw-Hill Professional.

Shoemaker, T., & Mack, J. (2009). *The lineman and cableman's field manual* (2nd ed.). New York, NY: McGraw-Hill Professional.

Surbrook, T., & Althouse, J. (2005). *Interpreting the national electric code*. Clifton Park, NY: Delmar.

Titus, P. A., Titus, J. L., & Traister, J. (2002). *Illustrated dictionary for electrical workers*. Albany, NY: Delmar.

Trout, C. (2002). *Electrical installation and inspection*. Albany, NY: Delmar.

VanSoelen, W. (2006). *The guide for linemen and cablemen*. Florence, KY: Cengage Delmar Learning, Inc.

VanSoelen, W. (2007). *The field guide for powerline workers*. Florence, KY: Cengage Delmar Learning, Inc.

Journals and Magazines

Blatt, M. (2009, November–December). Optical communications for improving the performance and reliability of the smart grid. *Electric Energy T&D Magazine, 6*(13). Retrieved December 14, 2009, from http://www.electricenergyonline.com/?page=show_article&mag=60&article=461

Boyle, J. (2009). Aerial lifts. TailGate Safety Topics. Retrieved December 14, 2009, from http://www.incident-prevention.com/component/zine/article/108-aerial-lifts.html

Coveney, M. (2009, November–December). Helping utilities attain sustainability through 'Green IT'. *Electric Energy T&D Magazine, 6*(13). Retrieved December 14, 2009, from http://www.electricenergyonline.com/?page=show_article&mag=60&article=457

Shein, R. (2009, November–December). Security quality and smart grid: The utilities' dilemma. *Electric Energy T&D Magazine*, *6*(13). Retrieved December 14, 2009, from http://www.electricenergyonline.com/?page=show_article&mag=60&article=460

Web Sites

Blackboard Academic Suite. (n.d.). Retrieved November 11, 2009, from http://rcu.blackboard.com/webapps/portal/frameset.jsp

Electric Energy Online (2009). *Electric Energy Magazine*, Jaguar Media Inc., Terrebonne, Quebec Canada. Retrieved December 3, 2009, from http://www.electricenergyonline.com/?page=home

E-School News. (n.d.). Retrieved November 12, 2009, from http://www.eschoolnews.com/news/top-news/index.cfm?i=50758

How stuff works. (n.d.). Retrieved November 11, 2009, from http://www.howstuffworks.com/

Kathy Schrock's guide for educators. (n.d.). In discovery education. Retrieved November 11, 2009, from http://school.discoveryeducation.com/schrockguide/

OSHA Instruction. (2003). Enforcement of the electric power generation, transmission, and distribution standard. Retrieved on December 14, 2009, from http://www.osha.gov/OshDoc/Directive_pdf/CPL_2-1_38.pdf

OSHA Construction Regulations. (September, 2008). Retrieved December 3, 2009, from http://www.osha.gov/SLTC/powergeneration/construction.html

Spears, R. (2003). The ruler game. Retrieved on November 11, 2009, from http://www.rickyspears.com/rulergame/

Teacher Vision. (n.d.). Retrieved November 11, 2009, from http://www.teachervision.fen.com/

Tech Learning. (n.d.). Retrieved November 11, 2009, from http://techlearning.com

Vocational Information Center. (n.d.). About vocational education. In Career and technical–vocational education. Retrieved November 11, 2009, from http://www.khake.com/page50.html

Course Name: Safety for Line Workers

Course Abbreviation: ULT 1133

Classification: AAS Core

Description: This course is design to provide fundamental safety rules and procedures needed in performing basic line worker skills. (3 sch: 2-hr lecture, 2-hr lab)

Prerequisite: None

Competencies and Suggested Objectives
1. Discuss OSHA standards 269. (DOK1, GTD, SED, SAF)
2. Provide American Red Cross CPR and first-aid training and certification. (DOK1, SED, SAF) a. Discuss transference and avoidance of blood-borne pathogens. (DOK1)
3. Demonstrate the proper use of personal protective equipment as prescribed by OSHA. (DOK1)
4. Discuss job-site safety. (DOK1, GTD, SER, RPS, SED, SHP, LAD, SRP, SFP, MHE. RIG, SAF) a. Demonstrate safety procedures relating to confined spaces, shoring, and chain saws. (DOK2) b. Demonstrate safety procedures relating to hydraulic tool operations. (DOK1) c. Apply pole safety inspection procedures. (DOK1)
5. Explain the importance of the proper handling of HazMat (Hazardous Materials) and MSDSs (Material Safety Data Sheets) as required by OSHA. (DOK1, RPS, SED, SRP, MHE, SAF)
6. Discuss Lockout Tagout procedures. (DOK1, SED)
7. Discuss/Demonstrate proper grounding techniques. (DOK1, SED, RIG, SAF)
8. Discuss/Demonstrate proper testing, grounding, and flagging for emergency restorations. (DOK1, SER, RPS, SED, RIG, SAF)

STANDARDS

Code of Federal Regulation OSHA Standards

GTD	Electric Power Generation, Transmission, and Distribution 1910.269
SER	Specific excavation requirements 1926.651
RPS	Requirements for protective systems 1926.652
SED	Safety training and education 1926.21
SHP	Head protection 1926.100
LAD	Ladders 1926.1053
SRP	Respiratory protection 1910.134
SFP	Duty to have fall protection 1926.501
MHE	Material handling equipment 1926.602
RIG	Rigging equipment for material handling 1926.251
SAF	General safety and health provisions 1926.20

Code of Federal Regulation OSHA Standards

GTD Electric Power Generation, Transmission, and Distribution 1910.269
SER Specific excavation requirements 1926.651

CONTREN Core

SAF Basic Safety (MODULE 00101-09)

Related Academic Standards

R1 Interpret Graphic Information (forms, maps, reference sources)
R2 Words in Context (same and opposite meaning)
R3 Recall Information (details, sequence)
R4 Construct Meaning (main idea, summary/paraphrase, compare/contrast, cause/effect)
R5 Evaluate/Extend Meaning (fact/opinion, predict outcomes, point of view)
M1 Addition of Whole Numbers (no regrouping, regrouping)
M2 Subtraction of Whole Numbers (no regrouping, regrouping)
M3 Multiplication of Whole Numbers (no regrouping, regrouping)
M4 Division of Whole Numbers (no remainder, remainder)
M5 Decimals (addition, subtraction, multiplication, division)
M6 Fractions (addition, subtraction, multiplication, division)
M7 Integers (addition, subtraction, multiplication, division)
M8 Percents
M9 Algebraic Operations
A1 Numeration (ordering, place value, scientific notation)
A2 Number Theory (ratio, proportion)
A3 Data Interpretation (graph, table, chart, diagram)
A4 Pre-Algebra and Algebra (equations, inequality)
A5 Measurement (money, time, temperature, length, area, volume)
A6 Geometry (angles, Pythagorean theory)
A7 Computation in Context (whole numbers, decimals, fractions, algebraic operations)
A8 Estimation (rounding, estimation)
L1 Usage (pronoun, tense, subject/verb agreement, adjective, adverb)
L2 Sentence Formation (fragments, run-on, clarity)
L3 Paragraph Development (topic sentence, supporting sentence, sequence)
L4 Capitalization (proper noun, titles)
L5 Punctuation (comma, semicolon)
L6 Writing Conventions (quotation marks, apostrophe, parts of a letter)
S1 Vowel (short, long)
S2 Consonant (variant spelling, silent letter)
S3 Structural Unit (root, suffix)

21st Century Skills

CS1 Global Awareness
CS2 Financial, Economic, Business and Entrepreneurial Literacy
CS3 Civic Literacy
CS7 Critical Thinking and Problem Solving
CS8 Information and Communication Skills
CS9 Information Literacy
CS13 Initiative and Self-Direction

SUGGESTED REFERENCES

Burkart, M., McCann, M., & Paine, D. (2004). *Elevated work platforms and scaffolding*. New York, NY: McGraw-Hill Professional.

Carman, R. A., & Saunders, H. M. (2005). *Mathematics for the trades: A guided approach*. Upper Saddle River, NJ: Pearson Prentice Hall.

Cook, N. P. (2004). *Introductory mathematics*. Upper Saddle River, NJ: Pearson Prentice Hall.

Cook, N. P. (2004). *Mathematics for technical trades*. Upper Saddle River, NJ: Pearson Prentice Hall.

Harman, T. L. (2005). *Guide to the national electric code*. Upper Saddle River, NJ: Prentice Hall.

Hart, G. V. (2008). *Ugly's electrical references*. Houston, TX: Jones Bartlett Publishers.

Henry, T. (n.d.). *Dictionary for the electrician with formulas*. Winter Park, FL: Henry Publications.

Herman, S. L. (2007). *Alternating current fundamentals*. Florence, KY: Cengage Delmar Learning, Inc.

Herman, S. L. (2009). *Delmar's standard textbook of electricity*. Florence, KY: Cengage Delmar Learning, Inc.

Keljik, J. (2009). *Electricity 3: Power generation and delivery*. Florence, KY: Cengage Delmar Learning, Inc.

Keljik, J. (2009). *Electricity 4: AC/DC motors, controls, and maintenance*. Florence, KY: Cengage Delmar Learning, Inc.

Kubala, T. (2009). *Electricity 1: Devices, circuits, and materials*. Florence, KY: Cengage Delmar Learning, Inc.

Kubala, T. (2009). *Electricity 2: Devices, circuits, and materials*. Florence, KY: Cengage Delmar Learning, Inc.

MacDonald, J., Rossnagel, W., & Higgins, L. (2009). *Handbook of rigging*. New York, NY: McGraw-Hill Professional.

Marne, D. (2006, October). *National electrical safety code (NESC) handbook 2007* (2nd ed.). New York, NY: McGraw-Hill Professional.

Mazur, G. A., & Zurlis, P. A. (2003). *Electrical principles and practices*. Homewood, IL: American Technical.

Mullin, R. C., & Smith, R. L. (2005). *Electrical wiring commercial*. Clifton Park, NY: Delmar.

National Center for Construction Education and Research. (2009). *Core curriculum*. Upper Saddle River, NJ: Pearson Prentice Hall.

National Fire Protection Association. (2005). *National electric code*. Clifton Park, NY: Delmar.

Rockis, G., & Mazur, G. (2001). *Electrical motor controls*. Homewood, IL: American Technical.

Shoemaker, T., & Mack, J. (2007). *The lineman's and cableman's handbook* (11th ed.). New York, NY: McGraw-Hill Professional.

Shoemaker, T., & Mack, J. (2009). *The lineman and cableman's field manual* (2nd ed.). New York, NY: McGraw-Hill Professional.

Surbrook, T., & Althouse, J. (2005). *Interpreting the national electric code*. Clifton Park, NY: Delmar.

Titus, P. A., Titus, J. L., & Traister, J. (2002). *Illustrated dictionary for electrical workers*. Albany, NY: Delmar.

Trout, C. (2002). *Electrical installation and inspection*. Albany, NY: Delmar.

VanSoelen, W. (2006). *The guide for linemen and cablemen*. Florence, KY: Cengage Delmar Learning, Inc.

VanSoelen, W. (2007). *The field guide for powerline workers*. Florence, KY: Cengage Delmar Learning, Inc.

Journals and Magazines

Blatt, M. (2009, November–December). Optical communications for improving the performance and reliability of the smart grid. *Electric Energy T&D Magazine, 6*(13). Retrieved

December 14, 2009, from
http://www.electricenergyonline.com/?page=show_article&mag=60&article=461

Boyle, J. (2009). Aerial lifts. TailGate Safety Topics. Retrieved December 14, 2009, from http://www.incident-prevention.com/component/zine/article/108-aerial-lifts.html

Coveney, M. (2009, November–December). Helping utilities attain sustainability through 'Green IT'. *Electric Energy T&D Magazine*, *6*(13). Retrieved December 14, 2009, from http://www.electricenergyonline.com/?page=show_article&mag=60&article=457

Shein, R. (2009, November–December). Security quality and smart grid: The utilities' dilemma. *Electric Energy T&D Magazine*, *6*(13). Retrieved December 14, 2009, from http://www.electricenergyonline.com/?page=show_article&mag=60&article=460

Web Sites

Blackboard Academic Suite. (n.d.). Retrieved November 11, 2009, from http://rcu.blackboard.com/webapps/portal/frameset.jsp

Electric Energy Online (2009). *Electric Energy Magazine*, Jaguar Media Inc., Terrebonne, Quebec Canada. Retrieved December 3, 2009, from http://www.electricenergyonline.com/?page=home

E-School News. (n.d.). Retrieved November 12, 2009, from http://www.eschoolnews.com/news/top-news/index.cfm?i=50758

How stuff works. (n.d.). Retrieved November 11, 2009, from http://www.howstuffworks.com/

Kathy Schrock's guide for educators. (n.d.). In discovery education. Retrieved November 11, 2009, from http://school.discoveryeducation.com/schrockguide/

OSHA Instruction. (2003). Enforcement of the electric power generation, transmission, and distribution standard. Retrieved on December 14, 2009, from http://www.osha.gov/OshDoc/Directive_pdf/CPL_2-1_38.pdf

OSHA Construction Regulations. (September, 2008). Retrieved December 3, 2009, from http://www.osha.gov/SLTC/powergeneration/construction.html

Spears, R. (2003). The ruler game. Retrieved on November 11, 2009, from http://www.rickyspears.com/rulergame/

Teacher Vision. (n.d.). Retrieved November 11, 2009, from http://www.teachervision.fen.com/

Tech Learning. (n.d.). Retrieved November 11, 2009, from http://techlearning.com

Vocational Information Center. (n.d.). About vocational education. In Career and technical–vocational education. Retrieved November 11, 2009, from http://www.khake.com/page50.html

Course Name: AC and DC Circuits for Utility Line Worker Technology

Course Abbreviation: ULT 1144

Classification: AAS Core

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 AC and DC circuits (4 sch: 3-hr lecture, 2-hr lab)

Pre/Co Requisite		
Fundamentals of Electricity for Line Workers (ULT 1192) **or** Fundamentals of Electricity (ELT 1192)	**OR**	By consent of instructor

Competencies and Suggested Objectives
1. Demonstrate and practice general safety procedures in the school and work-site environments. (DOK1, ELT1.4) a. Apply relevant and appropriate safety techniques. (DOK1) b. Demonstrate and comply with relevant OSHA safety standards. (DOK1)
2. Demonstrate and apply a basic AC/DC electrical circuit. (DOK2, ELT1.4, ELT2.1)
3. Demonstrate the meaning of and relationships among and between voltage, current, resistance, and power in AC and DC circuits. (DOK1, ELT1.4, ELT2.1) a. Explain the relationship between voltage, current, and resistance in AC and DC circuits. (DOK1) b. Explain how power is developed in a circuit. (DOK1) c. Explain proper techniques for connecting a voltmeter or current meter to make measurements. (DOK1)
4. Analyze and evaluate the parameters of AC and DC series, parallel, and series-parallel circuits. (DOK3, ELT1.12)
5. Analyze transformer voltage, current, impedance transformations, and applications. (DOK3, ELT1.12) a. Calculate primary and secondary transformer voltage and current as related to the transformer's turns ratio. (DOK1) b. Explain the theory of reflected impedance between the primary and secondary, or secondaries, of utility transformers. (DOK1) c. Explain various transformer ratings, such as voltage, current, power, impedance, frequency, and efficiency. (DOK1) d. Explain various transformer losses such as winding losses and core losses. (DOK1) e. Construct transformer circuits, and measure voltages and currents as calculated. (DOK3)

STANDARDS

ELT1.4 Electrical Theory
ELT1.12 Electrical Test Equipment
ELT2.1 Alternating Current

Related Academic Standards

R1 Interpret Graphic Information (forms, maps, reference sources)
R2 Words in Context (same and opposite meaning)
R3 Recall Information (details, sequence)
R4 Construct Meaning (main idea, summary/paraphrase, compare/contrast, cause/effect)
R5 Evaluate/Extend Meaning (fact/opinion, predict outcomes, point of view)
M1 Addition of Whole Numbers (no regrouping, regrouping)
M2 Subtraction of Whole Numbers (no regrouping, regrouping)
M3 Multiplication of Whole Numbers (no regrouping, regrouping)
M4 Division of Whole Numbers (no remainder, remainder)
M5 Decimals (addition, subtraction, multiplication, division)
M6 Fractions (addition, subtraction, multiplication, division)
M7 Integers (addition, subtraction, multiplication, division)
M8 Percents
M9 Algebraic Operations
A1 Numeration (ordering, place value, scientific notation)
A2 Number Theory (ratio, proportion)
A3 Data Interpretation (graph, table, chart, diagram)
A4 Pre-Algebra and Algebra (equations, inequality)
A5 Measurement (money, time, temperature, length, area, volume)
A6 Geometry (angles, Pythagorean theory)
A7 Computation in Context (whole numbers, decimals, fractions, algebraic operations)
A8 Estimation (rounding, estimation)
L1 Usage (pronoun, tense, subject/verb agreement, adjective, adverb)
L2 Sentence Formation (fragments, run-on, clarity)
L3 Paragraph Development (topic sentence, supporting sentence, sequence)
L4 Capitalization (proper noun, titles)
L5 Punctuation (comma, semicolon)
L6 Writing Conventions (quotation marks, apostrophe, parts of a letter)
S1 Vowel (short, long)
S2 Consonant (variant spelling, silent letter)
S3 Structural Unit (root, suffix)

21st Century Skills

CS1 Global Awareness
CS2 Financial, Economic, Business and Entrepreneurial Literacy
CS3 Civic Literacy
CS7 Critical Thinking and Problem Solving
CS8 Information and Communication Skills
CS9 Information Literacy
CS13 Initiative and Self-Direction

SUGGESTED REFERENCES

Burkart, M., McCann, M., & Paine, D. (2004). *Elevated work platforms and scaffolding*. New York, NY: McGraw-Hill Professional.

Carman, R. A., & Saunders, H. M. (2005). *Mathematics for the trades: A guided approach*. Upper Saddle River, NJ: Pearson Prentice Hall.

Cook, N. P. (2004). *Introductory mathematics*. Upper Saddle River, NJ: Pearson Prentice Hall.

Cook, N. P. (2004). *Mathematics for technical trades*. Upper Saddle River, NJ: Pearson Prentice Hall.

Harman, T. L. (2005). *Guide to the national electric code*. Upper Saddle River, NJ: Prentice Hall.

Hart, G. V. (2008). *Ugly's electrical references*. Houston, TX: Jones Bartlett Publishers.

Henry, T. (n.d.). *Dictionary for the electrician with formulas*. Winter Park, FL: Henry Publications.

Herman, S. L. (2007). *Alternating current fundamentals*. Florence, KY: Cengage Delmar Learning, Inc.

Herman, S. L. (2009). *Delmar's standard textbook of electricity*. Florence, KY: Cengage Delmar Learning, Inc.

Keljik, J. (2009). *Electricity 3: Power generation and delivery*. Florence, KY: Cengage Delmar Learning, Inc.

Keljik, J. (2009). *Electricity 4: AC/DC motors, controls, and maintenance*. Florence, KY: Cengage Delmar Learning, Inc.

Kubala, T. (2009). *Electricity 1: Devices, circuits, and materials*. Florence, KY: Cengage Delmar Learning, Inc.

Kubala, T. (2009). *Electricity 2: Devices, circuits, and materials*. Florence, KY: Cengage Delmar Learning, Inc.

MacDonald, J., Rossnagel, W., & Higgins, L. (2009). *Handbook of rigging*. New York, NY: McGraw-Hill Professional.

Marne, D. (2006, October). *National electrical safety code (NESC) handbook 2007* (2nd ed.). New York, NY: McGraw-Hill Professional.

Mazur, G. A., & Zurlis, P. A. (2003). *Electrical principles and practices*. Homewood, IL: American Technical.

Mullin, R. C., & Smith, R. L. (2005). *Electrical wiring commercial*. Clifton Park, NY: Delmar.

National Center for Construction Education and Research. (2009). *Core curriculum*. Upper Saddle River, NJ: Pearson Prentice Hall.

National Fire Protection Association. (2005). *National electric code*. Clifton Park, NY: Delmar.

Rockis, G., & Mazur, G. (2001). *Electrical motor controls*. Homewood, IL: American Technical.

Shoemaker, T., & Mack, J. (2007). *The lineman's and cableman's handbook* (11th ed.). New York, NY: McGraw-Hill Professional.

Shoemaker, T., & Mack, J. (2009). *The lineman and cableman's field manual* (2nd ed.). New York, NY: McGraw-Hill Professional.

Surbrook, T., & Althouse, J. (2005). *Interpreting the national electric code*. Clifton Park, NY: Delmar.

Titus, P. A., Titus, J. L., & Traister, J. (2002). *Illustrated dictionary for electrical workers*. Albany, NY: Delmar.

Trout, C. (2002). *Electrical installation and inspection*. Albany, NY: Delmar.

VanSoelen, W. (2006). *The guide for linemen and cablemen*. Florence, KY: Cengage Delmar Learning, Inc.

VanSoelen, W. (2007). *The field guide for powerline workers*. Florence, KY: Cengage Delmar Learning, Inc.

Journals and Magazines

Blatt, M. (2009, November–December). Optical communications for improving the performance and reliability of the smart grid. *Electric Energy T&D Magazine, 6*(13). Retrieved December 14, 2009, from http://www.electricenergyonline.com/?page=show_article&mag=60&article=461

Boyle, J. (2009). Aerial lifts. TailGate Safety Topics. Retrieved December 14, 2009, from http://www.incident-prevention.com/component/zine/article/108-aerial-lifts.html

Coveney, M. (2009, November–December). Helping utilities attain sustainability through 'Green IT'. *Electric Energy T&D Magazine, 6*(13). Retrieved December 14, 2009, from http://www.electricenergyonline.com/?page=show_article&mag=60&article=457

Shein, R. (2009, November–December). Security quality and smart grid: The utilities' dilemma. *Electric Energy T&D Magazine, 6*(13). Retrieved December 14, 2009, from http://www.electricenergyonline.com/?page=show_article&mag=60&article=460

Web Sites

Blackboard Academic Suite. (n.d.). Retrieved November 11, 2009, from http://rcu.blackboard.com/webapps/portal/frameset.jsp

Electric Energy Online (2009). *Electric Energy Magazine*, Jaguar Media Inc., Terrebonne, Quebec Canada. Retrieved December 3, 2009, from http://www.electricenergyonline.com/?page=home

E-School News. (n.d.). Retrieved November 12, 2009, from http://www.eschoolnews.com/news/top-news/index.cfm?i=50758

How stuff works. (n.d.). Retrieved November 11, 2009, from http://www.howstuffworks.com/

Kathy Schrock's guide for educators. (n.d.). In discovery education. Retrieved November 11, 2009, from http://school.discoveryeducation.com/schrockguide/

OSHA Instruction. (2003). Enforcement of the electric power generation, transmission, and distribution standard. Retrieved on December 14, 2009, from http://www.osha.gov/OshDoc/Directive_pdf/CPL_2-1_38.pdf

OSHA Construction Regulations. (September, 2008). Retrieved December 3, 2009, from http://www.osha.gov/SLTC/powergeneration/construction.html

Spears, R. (2003). The ruler game. Retrieved on November 11, 2009, from http://www.rickyspears.com/rulergame/

Teacher Vision. (n.d.). Retrieved November 11, 2009, from http://www.teachervision.fen.com/

Tech Learning. (n.d.). Retrieved November 11, 2009, from http://techlearning.com

Vocational Information Center. (n.d.). About vocational education. In Career and technical–vocational education. Retrieved November 11, 2009, from http://www.khake.com/page50.html

Course Name: AC and DC Circuits for Line Workers

Course Abbreviation: ULT 1152

Classification: Career Elective

Description: Principles and theories associated with AC and DC circuits used in the line worker trade. Includes the study of electrical circuits, laws and formulas, and the use of test equipment to analyze AC and DC circuits (2 sch: 1-hr lecture, 2-hr lab)

Pre/Co Requisite		
Fundamentals of Electricity for Line Workers (ULT 1192) **or** Fundamentals of Electricity (ELT 1192) **or** equivalent course	**OR**	By consent of instructor

Competencies and Suggested Objectives
1. Demonstrate and practice general safety procedures in the school and work-site environments. (DOK1, ELT1.4) a. Apply relevant and appropriate safety techniques. (DOK1) b. Demonstrate and comply with relevant OSHA safety standards. (DOK1)
2. Demonstrate and apply a basic AC/DC electrical circuit. (DOK2, ELT1.4, ELT1.12, ELT2.1)
3. Demonstrate the meaning of and relationships among and between voltage, current, resistance, and power in AC and DC circuits. (DOK1 ELT1.4, ELT2.1) a. Explain the relationship between voltage, current, and resistance in AC and DC circuits. (DOK1) b. Explain how power is developed in a circuit. (DOK1) c. Explain proper techniques for connecting a voltmeter or current meter to make measurements. (DOK1)
4. Analyze and evaluate the parameters of AC and DC series, parallel, and series-parallel circuits. (DOK2, ELT1.4, ELT1.12, ELT2.1)

STANDARDS

ELT1.4 Electrical Theory
ELT1.12 Electrical Test Equipment
ELT2.1 Alternating Current

Related Academic Standards

R1 Interpret Graphic Information (forms, maps, reference sources)
R2 Words in Context (same and opposite meaning)
R3 Recall Information (details, sequence)
R4 Construct Meaning (main idea, summary/paraphrase, compare/contrast, cause/effect)

R5 Evaluate/Extend Meaning (fact/opinion, predict outcomes, point of view)
M1 Addition of Whole Numbers (no regrouping, regrouping)
M2 Subtraction of Whole Numbers (no regrouping, regrouping)
M3 Multiplication of Whole Numbers (no regrouping, regrouping)
M4 Division of Whole Numbers (no remainder, remainder)
M5 Decimals (addition, subtraction, multiplication, division)
M6 Fractions (addition, subtraction, multiplication, division)
M7 Integers (addition, subtraction, multiplication, division)
M8 Percents
M9 Algebraic Operations
A1 Numeration (ordering, place value, scientific notation)
A2 Number Theory (ratio, proportion)
A3 Data Interpretation (graph, table, chart, diagram)
A4 Pre-Algebra and Algebra (equations, inequality)
A5 Measurement (money, time, temperature, length, area, volume)
A6 Geometry (angles, Pythagorean theory)
A7 Computation in Context (whole numbers, decimals, fractions, algebraic operations)
A8 Estimation (rounding, estimation)
L1 Usage (pronoun, tense, subject/verb agreement, adjective, adverb)
L2 Sentence Formation (fragments, run-on, clarity)
L3 Paragraph Development (topic sentence, supporting sentence, sequence)
L4 Capitalization (proper noun, titles)
L5 Punctuation (comma, semicolon)
L6 Writing Conventions (quotation marks, apostrophe, parts of a letter)
S1 Vowel (short, long)
S2 Consonant (variant spelling, silent letter)
S3 Structural Unit (root, suffix)

21st Century Skills

CS1 Global Awareness
CS2 Financial, Economic, Business and Entrepreneurial Literacy
CS3 Civic Literacy
CS7 Critical Thinking and Problem Solving
CS8 Information and Communication Skills
CS9 Information Literacy
CS13 Initiative and Self-Direction

SUGGESTED REFERENCES

Burkart, M., McCann, M., & Paine, D. (2004). *Elevated work platforms and scaffolding*. New York, NY: McGraw-Hill Professional.

Carman, R. A., & Saunders, H. M. (2005). Mathematics for the trades: A guided approach. Upper Saddle River, NJ: Pearson Prentice Hall.

Cook, N. P. (2004). *Introductory mathematics*. Upper Saddle River, NJ: Pearson Prentice Hall.

Cook, N. P. (2004). *Mathematics for technical trades*. Upper Saddle River, NJ: Pearson Prentice Hall.

Harman, T. L. (2005). *Guide to the National Electric Code*. Upper Saddle River, NJ: Prentice Hall.

Hart, G. V. (2008). *Ugly's electrical references*. Houston, TX: Jones Bartlett Publishers.

Henry, T. (n.d.). *Dictionary for the electrician with formulas*. Winter Park, FL: Henry Publications.

Herman, S. L. (2007). *Alternating current fundamentals*. Florence, KY: Cengage Delmar Learning, Inc.

Herman, S. L. (2009). *Delmar's standard textbook of electricity*. Florence, KY: Cengage Delmar Learning, Inc.

Keljik, J. (2009). *Electricity 3: Power generation and delivery*. Florence, KY: Cengage Delmar Learning, Inc.

Keljik, J. (2009). *Electricity 4: AC/DC motors, controls, and maintenance*. Florence, KY: Cengage Delmar Learning, Inc.

Kubala, T. (2009). *Electricity 1: Devices, circuits, and materials*. Florence, KY: Cengage Delmar Learning, Inc.

Kubala, T. (2009). *Electricity 2: Devices, circuits, and materials*. Florence, KY: Cengage Delmar Learning, Inc.

MacDonald, J., Rossnagel, W., & Higgins, L. (2009). *Handbook of rigging*. New York, NY: McGraw-Hill Professional.

Marne, D. (2006, October). *National electrical safety code (NESC) handbook 2007* (2nd ed.). New York, NY: McGraw-Hill Professional.

Mazur, G. A., & Zurlis, P. A. (2003). *Electrical principles and practices*. Homewood, IL: American Technical.

Mullin, R. C., & Smith, R. L. (2005). *Electrical wiring commercial*. Clifton Park, NY: Delmar.

National Center for Construction Education and Research. (2009). *Core curriculum*. Upper Saddle River, NJ: Pearson Prentice Hall.

National Fire Protection Association. (2005). *National electric code*. Clifton Park, NY: Delmar.

Rockis, G., & Mazur, G. (2001). *Electrical motor controls*. Homewood, IL: American Technical.

Shoemaker, T., & Mack, J. (2007). *The lineman's and cableman's handbook* (11th ed.). New York, NY: McGraw-Hill Professional.

Shoemaker, T., & Mack, J. (2009). *The lineman and cableman's field manual* (2nd ed.). New York, NY: McGraw-Hill Professional.

Surbrook, T., & Althouse, J. (2005). *Interpreting the national electric code*. Clifton Park, NY: Delmar.

Titus, P. A., Titus, J. L., & Traister, J. (2002). *Illustrated dictionary for electrical workers*. Albany, NY: Delmar.

Trout, C. (2002). *Electrical installation and inspection*. Albany, NY: Delmar.

VanSoelen, W. (2006). *The guide for linemen and cablemen*. Florence, KY: Cengage Delmar Learning, Inc.

VanSoelen, W. (2007). *The field guide for powerline workers*. Florence, KY: Cengage Delmar Learning, Inc.

Journals and Magazines

Blatt, M. (2009, November–December). Optical communications for improving the performance and reliability of the smart grid. *Electric Energy T&D Magazine, 6*(13). Retrieved December 14, 2009, from http://www.electricenergyonline.com/?page=show_article&mag=60&article=461

Boyle, J. (2009). Aerial lifts. TailGate Safety Topics. Retrieved December 14, 2009, from http://www.incident-prevention.com/component/zine/article/108-aerial-lifts.html

Coveney, M. (2009, November–December). Helping utilities attain sustainability through 'Green IT'. *Electric Energy T&D Magazine*, *6*(13). Retrieved December 14, 2009, from http://www.electricenergyonline.com/?page=show_article&mag=60&article=457

Shein, R. (2009, November–December). Security quality and smart grid: The utilities' dilemma. *Electric Energy T&D Magazine*, *6*(13). Retrieved December 14, 2009, from http://www.electricenergyonline.com/?page=show_article&mag=60&article=460

Web Sites

Blackboard Academic Suite. (n.d.). Retrieved November 11, 2009, from http://rcu.blackboard.com/webapps/portal/frameset.jsp

Electric Energy Online (2009). *Electric Energy Magazine*, Jaguar Media Inc., Terrebonne, Quebec Canada. Retrieved December 3, 2009, from http://www.electricenergyonline.com/?page=home

E-School News. (n.d.). Retrieved November 12, 2009, from http://www.eschoolnews.com/news/top-news/index.cfm?i=50758

How stuff works. (n.d.). Retrieved November 11, 2009, from http://www.howstuffworks.com/

Kathy Schrock's guide for educators. (n.d.). In discovery education. Retrieved November 11, 2009, from http://school.discoveryeducation.com/schrockguide/

OSHA Instruction. (2003). Enforcement of the electric power generation, transmission, and distribution standard. Retrieved on December 14, 2009, from http://www.osha.gov/OshDoc/Directive_pdf/CPL_2-1_38.pdf

OSHA Construction Regulations. (September, 2008). Retrieved December 3, 2009, from http://www.osha.gov/SLTC/powergeneration/construction.html

Spears, R. (2003). The ruler game. Retrieved on November 11, 2009, from http://www.rickyspears.com/rulergame/

Teacher Vision. (n.d.). Retrieved November 11, 2009, from http://www.teachervision.fen.com/

Tech Learning. (n.d.). Retrieved November 11, 2009, from http://techlearning.com

Vocational Information Center. (n.d.). About vocational education. In Career and technical–vocational education. Retrieved November 11, 2009, from http://www.khake.com/page50.html

Course Name: Fundamentals of Electricity for Line Workers

Course Abbreviation: ULT 1192

Classification: Career - AAS Elective

Description: Fundamental skills associated with all electrical courses. Safety, basic tools, special tools, equipment, and introduction to AC and DC circuits (2 sch: 1-hr lecture, 2-hr lab)

Prerequisites: None

Competencies and Suggested Objectives
1. Apply general safety procedures in the shop, lab, and industrial environment. (DOK1, ELT1.2) a. Apply proper safety techniques for all types of circuits and components used in the utility craft. (DOK1) b. Demonstrate an understanding of and comply with relevant OSHA, NEC, and NESC safety standards. (DOK1)
2. Demonstrate use of electrical tools, equipment, and references. (DOK2, ELT1.5, ELT1.12) a. Identify and demonstrate proper use of basic tools such as meters, drills, and other hand held equipment. (DOK1) b. Demonstrate the use of and reading of a rule and/or measuring tape. (DOK1) c. Locate and interpret information in the NESC relative to a specific job. (DOK2)
3. Solve problems using Ohm's law. (DOK1, ELT1.4) a. List three formulae for Ohm's law. (DOK1) b. Solve problems for an unknown voltage, amperage, resistance, and wattage. (DOK1)

STANDARDS

National Center for Construction Education and Research Standards

ELT1.2	Electrical Safety
ELT1.4	Electrical Theory
ELT1.5	Introduction to the National Electrical Code
ELT1.12	Electrical Test Equipment

Related Academic Standards

C1	Interpret written material.
C2	Interpret visual materials (maps, charts, graphs, tables, etc.).
C3	Listen, comprehend, and take appropriate actions.
C5	Use written and/or oral language skills to work cooperatively to solve problems, make decisions, take actions, and reach agreement.
C6	Communicate ideas and information effectively using various oral and written forms for a variety of audiences and purposes.
M1	Relate number relationships, number systems, and number theory.

M2 Explore patterns and functions.
M4 Explore the concepts of measurement.
M7 Apply mathematical methods, concepts, and properties to solve a variety of real-world problems.
S8 Apply concepts related to the scientific process and method to include safety procedures for classroom and laboratory; use and care of scientific equipment; interrelationships between science, technology, and society; and effective communication of scientific results in oral, written, and graphic form.

21st Century Skills

CS1 Global Awareness
CS2 Financial, Economic, Business and Entrepreneurial Literacy
CS3 Civic Literacy
CS7 Critical Thinking and Problem Solving
CS8 Information and Communication Skills
CS9 Information Literacy
CS13 Initiative and Self-Direction

SUGGESTED REFERENCES

Alerich, W. N., & Herman, S. L. (2003). *Electric motor control*. Albany, NY: Delmar.

Duff, J. R., & Herman, S. L. (2000). *Alternating current fundamentals*. Albany, NY: Delmar.

Harman, T. L. (2005). *Guide to the national electric code*. Upper Saddle River, NJ: Prentice Hall.

Hart, G. V. (2002). *Ugly's electrical references*. Houston, TX: Burleson Distributing.

Herman, S. L. (2002). *Electrical studies for trades*. Albany, NY: Delmar.

Herman, S. L. (2004). *Delmar's standard of electricity*. Clifton Park, NY: Delmar.

Lopez, O. E., & Tedsen, E. (2000). *Direct current fundamentals*. Albany, NY: Delmar.

Mazur, G. A., & Zurlis, P. A. (2003). *Electrical principles and practices*. Homewood, IL: American Technical.

Miller, C. (2005). *Illustrated guide to the NEC*. Clifton Park, NY: Delmar.

National Fire Protection Association. (2005). *National electric code*. Clifton Park, NY: Delmar.

O'Riley, R. (2002). Electrical grounding. Albany, NY: Delmar.

Surbrook, T., & Althouse, J. (2005). *Interpreting the national electric code*. Clifton Park, NY: Delmar.

Titus, P. A., Titus, J. L. & Traister, J. (2002). *Illustrated dictionary for electrical workers*. Albany, NY: Delmar.

Trout, C. (2002). *Electrical installation and inspection*. Albany, NY: Delmar.

Course Name: Electric Power

Course Abbreviation: ULT 1213

Classification: Career - AAS Elective

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 (3 sch: 2-hr lecture, 2-hr lab)

Pre/Co Requisite		
Fundamentals of Electricity for Line Workers (ULT 1192) **or** Fundamentals of Electricity (ELT 1192)	**OR**	By consent of instructor

Competencies and Suggested Objectives
1. Discuss safety and environmental protection concerns associated with electrical power equipment. (DOK1, ELT2.2, ELT3.7) a. List safety precautions associated with motors and transformers. (DOK1) b. Explain the procedures for working with and disposing of hazardous materials. (DOK1)
2. Wire single-phase electrical components. (DOK2, ELT2.2, ELT3.7) a. Sketch and connect a single-phase transformer for high- and low-voltage applications. (DOK2) b. Identify, sketch, and wire different types of single-phase motors. (DOK2) c. Explain and demonstrate the applications of an AC generator. (DOK2)
3. Wire three-phase electrical components. (DOK3, ELT2.2) a. Identify, draw, and wire different types of three-phase motors to include low and high voltage requirements. (DOK3)
4. Wire three-phase electrical components found in utility transmission. (DOK3, ELT3.7) 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. (DOK3) b. Identify, draw, and wire different types of three-phase protection devices to include low and high voltage requirements. (DOK3) c. Basic overview of electric power generation, transmission, and distribution to the consumer meter. (DOK1)

STANDARDS

National Center for Construction Education and Research Standards

ELT2.2 Motors: Theory and Application
ELT3.7 Transformers

Related Academic Standards

C1 Interpret written material.
C2 Interpret visual materials (maps, charts, graphs, tables, etc.).
C3 Listen, comprehend, and take appropriate actions.
C4 Access, organize, and evaluate information.
C5 Use written and/or oral language skills to work cooperatively to solve problems, make decisions, take actions, and reach agreement.
C6 Communicate ideas and information effectively using various oral and written forms for a variety of audiences and purposes.
M7 Apply mathematical methods, concepts, and properties to solve a variety of real-world problems.
S6 Explore the principles and theories related to motion, mechanics, electricity, magnetism, light energy, thermal energy, wave energy, and nuclear physics.
S8 Apply concepts related to the scientific process and method to include safety procedures for classroom and laboratory; use and care of scientific equipment; interrelationships between science, technology, and society; and effective communication of scientific results in oral, written, and graphic form.

21st Century Skills

CS1 Global Awareness
CS2 Financial, Economic, Business and Entrepreneurial Literacy
CS3 Civic Literacy
CS7 Critical Thinking and Problem Solving
CS8 Information and Communication Skills
CS9 Information Literacy
CS13 Initiative and Self-Direction

SUGGESTED REFERENCES

Burkart, M., McCann, M., & Paine, D. (2004). *Elevated work platforms and scaffolding*. New York, NY: McGraw-Hill Professional.

Carman, R. A., & Saunders, H. M. (2005). *Mathematics for the trades: A guided approach*. Upper Saddle River, NJ: Pearson Prentice Hall.

Cook, N. P. (2004). *Introductory mathematics*. Upper Saddle River, NJ: Pearson Prentice Hall.

Cook, N. P. (2004). *Mathematics for technical trades*. Upper Saddle River, NJ: Pearson Prentice Hall.

Harman, T. L. (2005). *Guide to the national electric code*. Upper Saddle River, NJ: Prentice Hall.

Hart, G. V. (2008). *Ugly's electrical references*. Houston, TX: Jones Bartlett Publishers.

Henry, T. (n.d.). *Dictionary for the electrician with formulas*. Winter Park, FL: Henry Publications.

Herman, S. L. (2007). *Alternating current fundamentals*. Florence, KY: Cengage Delmar Learning, Inc.

Herman, S. L. (2009). *Delmar's standard textbook of electricity*. Florence, KY: Cengage Delmar Learning, Inc.

Keljik, J. (2009). *Electricity 3: Power generation and delivery*. Florence, KY: Cengage Delmar Learning, Inc.

Keljik, J. (2009). *Electricity 4: AC/DC motors, controls, and maintenance*. Florence, KY: Cengage Delmar Learning, Inc.

Kubala, T. (2009). *Electricity 1: Devices, circuits, and materials*. Florence, KY: Cengage Delmar Learning, Inc.

Kubala, T. (2009). *Electricity 2: Devices, circuits, and materials*. Florence, KY: Cengage Delmar Learning, Inc.

MacDonald, J., Rossnagel, W., & Higgins, L. (2009). *Handbook of rigging*. New York, NY: McGraw-Hill Professional.

Marne, D. (2006, October). *National electrical safety code (NESC) handbook 2007* (2nd ed.). New York, NY: McGraw-Hill Professional.

Mazur, G. A., & Zurlis, P. A. (2003). *Electrical principles and practices*. Homewood, IL: American Technical.

Mullin, R. C., & Smith, R. L. (2005). *Electrical wiring commercial*. Clifton Park, NY: Delmar.

National Center for Construction Education and Research. (2009). *Core curriculum*. Upper Saddle River, NJ: Pearson Prentice Hall.

National Fire Protection Association. (2005). *National electric code*. Clifton Park, NY: Delmar.

Rockis, G., & Mazur, G. (2001). *Electrical motor controls*. Homewood, IL: American Technical.

Shoemaker, T., & Mack, J. (2007). *The lineman's and cableman's handbook* (11th ed.). New York, NY: McGraw-Hill Professional.

Shoemaker, T., & Mack, J. (2009). *The lineman and cableman's field manual* (2nd ed.). New York, NY: McGraw-Hill Professional.

Surbrook, T., & Althouse, J. (2005). *Interpreting the national electric code*. Clifton Park, NY: Delmar.

Titus, P. A., Titus, J. L., & Traister, J. (2002). *Illustrated dictionary for electrical workers*. Albany, NY: Delmar.

Trout, C. (2002). *Electrical installation and inspection*. Albany, NY: Delmar.

VanSoelen, W. (2006). *The guide for linemen and cablemen*. Florence, KY: Cengage Delmar Learning, Inc.

VanSoelen, W. (2007). *The field guide for powerline workers*. Florence, KY: Cengage Delmar Learning, Inc.

Journals and Magazines

Blatt, M. (2009, November–December). Optical communications for improving the performance and reliability of the smart grid. *Electric Energy T&D Magazine, 6*(13). Retrieved December 14, 2009, from http://www.electricenergyonline.com/?page=show_article&mag=60&article=461

Boyle, J. (2009). Aerial lifts. TailGate Safety Topics. Retrieved December 14, 2009, from http://www.incident-prevention.com/component/zine/article/108-aerial-lifts.html

Coveney, M. (2009, November–December). Helping utilities attain sustainability through 'Green IT'. *Electric Energy T&D Magazine, 6*(13). Retrieved December 14, 2009, from http://www.electricenergyonline.com/?page=show_article&mag=60&article=457

Shein, R. (2009, November–December). Security quality and smart grid: The utilities' dilemma. *Electric Energy T&D Magazine, 6*(13). Retrieved December 14, 2009, from http://www.electricenergyonline.com/?page=show_article&mag=60&article=460

Web Sites

Blackboard Academic Suite. (n.d.). Retrieved November 11, 2009, from http://rcu.blackboard.com/webapps/portal/frameset.jsp

Electric Energy Online (2009). *Electric Energy Magazine*, Jaguar Media Inc., Terrebonne, Quebec Canada. Retrieved December 3, 2009, from http://www.electricenergyonline.com/?page=home

E-School News. (n.d.). Retrieved November 12, 2009, from http://www.eschoolnews.com/news/top-news/index.cfm?i=50758

How stuff works. (n.d.). Retrieved November 11, 2009, from http://www.howstuffworks.com/

Kathy Schrock's guide for educators. (n.d.). In discovery education. Retrieved November 11, 2009, from http://school.discoveryeducation.com/schrockguide/

OSHA Instruction. (2003). Enforcement of the electric power generation, transmission, and distribution standard. Retrieved on December 14, 2009, from http://www.osha.gov/OshDoc/Directive_pdf/CPL_2-1_38.pdf

OSHA Construction Regulations. (September, 2008). Retrieved December 3, 2009, from http://www.osha.gov/SLTC/powergeneration/construction.html

Spears, R. (2003). The ruler game. Retrieved on November 11, 2009, from http://www.rickyspears.com/rulergame/

Teacher Vision. (n.d.). Retrieved November 11, 2009, from http://www.teachervision.fen.com/

Tech Learning. (n.d.). Retrieved November 11, 2009, from http://techlearning.com

Vocational Information Center. (n.d.). About vocational education. In Career and technical–vocational education. Retrieved November 11, 2009, from http://www.khake.com/page50.html

Course Name: Transformer Operation and Banking

Course Abbreviation: ULT 1223

Classification: Career - AAS Elective

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. (3 sch: 2-hr lecture, 2-hr lab)

Pre/Co Requisite				
Fundamentals of Electricity for Line Workers (ULT 1192) **or** Fundamentals of Electricity (ELT 1192)	**AND**	AC and DC for Utility Line Worker Technology (ULT 1144) **or** AC and DC Circuits (ELT 1144) **AND** Electric Power (ULT 1213)	**OR**	By consent of instructor

Competencies and Suggested Objectives
1. Discuss safety and environmental protection concerns associated with electrical power equipment. (DOK1, ELT1.2) a. List safety precautions associated with motors and transformers. (DOK1) b. Explain the procedures for working with and disposing of hazardous materials. (DOK1)
2. Wire single-phase electrical components. (DOK2, ELT1.4, ELT3.7) a. Sketch and connect a single-phase transformer. (DOK2)
3. Wire three-phase electrical components. (DOK3, ELT1.4, ELT3.7) a. Sketch and connect AC transformers to include delta and wye and three-wire and four-wire systems. (DOK3)
4. Demonstrate installation of a three-phase open and closed transformer banks. (DOK3, ELT3.7)
5. Discuss troubleshooting techniques. (DOK1, ELT1.4, ELT2.2)
6. Discuss rotation and phasing. (DOK3, ELT1.4, ELT2.2)

STANDARDS

ELT1.2 Electrical Safety
ELT1.4 Electrical Theory
ELT2.2 Motors: Theory and Application
ELT3.7 Transformers

Related Academic Standards

R1 Interpret Graphic Information (forms, maps, reference sources)
R2 Words in Context (same and opposite meaning)
R3 Recall Information (details, sequence)
R4 Construct Meaning (main idea, summary/paraphrase, compare/contrast, cause/effect)
R5 Evaluate/Extend Meaning (fact/opinion, predict outcomes, point of view)

M1 Addition of Whole Numbers (no regrouping, regrouping)
M2 Subtraction of Whole Numbers (no regrouping, regrouping)
M3 Multiplication of Whole Numbers (no regrouping, regrouping)
M4 Division of Whole Numbers (no remainder, remainder)
M5 Decimals (addition, subtraction, multiplication, division)
M6 Fractions (addition, subtraction, multiplication, division)
M7 Integers (addition, subtraction, multiplication, division)
M8 Percents
M9 Algebraic Operations
A1 Numeration (ordering, place value, scientific notation)
A2 Number Theory (ratio, proportion)
A3 Data Interpretation (graph, table, chart, diagram)
A4 Pre-Algebra and Algebra (equations, inequality)
A5 Measurement (money, time, temperature, length, area, volume)
A6 Geometry (angles, Pythagorean theory)
A7 Computation in Context (whole numbers, decimals, fractions, algebraic operations)
A8 Estimation (rounding, estimation)
L1 Usage (pronoun, tense, subject/verb agreement, adjective, adverb)
L2 Sentence Formation (fragments, run-on, clarity)
L3 Paragraph Development (topic sentence, supporting sentence, sequence)
L4 Capitalization (proper noun, titles)
L5 Punctuation (comma, semicolon)
L6 Writing Conventions (quotation marks, apostrophe, parts of a letter)
S1 Vowel (short, long)
S2 Consonant (variant spelling, silent letter)
S3 Structural Unit (root, suffix)

21st Century Skills

CS1 Global Awareness
CS2 Financial, Economic, Business and Entrepreneurial Literacy
CS3 Civic Literacy
CS7 Critical Thinking and Problem Solving
CS8 Information and Communication Skills
CS9 Information Literacy
CS13 Initiative and Self-Direction

SUGGESTED REFERENCES

Burkart, M., McCann, M., & Paine, D. (2004). *Elevated work platforms and scaffolding*. New York, NY: McGraw-Hill Professional.

Carman, R. A., & Saunders, H. M. (2005). *Mathematics for the trades: A guided approach*. Upper Saddle River, NJ: Pearson Prentice Hall.

Cook, N. P. (2004). *Introductory mathematics*. Upper Saddle River, NJ: Pearson Prentice Hall.

Cook, N. P. (2004). *Mathematics for technical trades*. Upper Saddle River, NJ: Pearson Prentice Hall.

Harman, T. L. (2005). *Guide to the national electric code*. Upper Saddle River, NJ: Prentice Hall.

Hart, G. V. (2008). *Ugly's electrical references*. Houston, TX: Jones Bartlett Publishers.

Henry, T. (n.d.). *Dictionary for the electrician with formulas*. Winter Park, FL: Henry Publications.

Herman, S. L. (2007). *Alternating current fundamentals*. Florence, KY: Cengage Delmar Learning, Inc.

Herman, S. L. (2009). *Delmar's standard textbook of electricity*. Florence, KY: Cengage Delmar Learning, Inc.

Keljik, J. (2009). *Electricity 3: Power generation and delivery*. Florence, KY: Cengage Delmar Learning, Inc.

Keljik, J. (2009). *Electricity 4: AC/DC motors, controls, and maintenance*. Florence, KY: Cengage Delmar Learning, Inc.

Kubala, T. (2009). *Electricity 1: Devices, circuits, and materials*. Florence, KY: Cengage Delmar Learning, Inc.

Kubala, T. (2009). *Electricity 2: Devices, circuits, and materials*. Florence, KY: Cengage Delmar Learning, Inc.

MacDonald, J., Rossnagel, W., & Higgins, L. (2009). *Handbook of rigging*. New York, NY: McGraw-Hill Professional.

Marne, D. (2006, October). *National electrical safety code (NESC) handbook 2007* (2nd ed.). New York, NY: McGraw-Hill Professional.

Mazur, G. A., & Zurlis, P. A. (2003). *Electrical principles and practices*. Homewood, IL: American Technical.

Mullin, R. C., & Smith, R. L. (2005). *Electrical wiring commercial*. Clifton Park, NY: Delmar.

National Center for Construction Education and Research. (2009). *Core curriculum*. Upper Saddle River, NJ: Pearson Prentice Hall.

Rockis, G., & Mazur, G. (2001). *Electrical motor controls*. Homewood, IL: American Technical.

Shoemaker, T., & Mack, J. (2007). *The lineman's and cableman's handbook* (11th ed.). New York, NY: McGraw-Hill Professional.

Shoemaker, T., & Mack, J. (2009). *The lineman and cableman's field manual* (2nd ed.). New York, NY: McGraw-Hill Professional.

Surbrook, T., & Althouse, J. (2005). *Interpreting the national electric code*. Clifton Park, NY: Delmar.

Titus, P. A., Titus, J. L., & Traister, J. (2002). *Illustrated dictionary for electrical workers*. Albany, NY: Delmar.

Trout, C. (2002). *Electrical installation and inspection*. Albany, NY: Delmar.

VanSoelen, W. (2006). *The guide for linemen and cablemen*. Florence, KY: Cengage Delmar Learning, Inc.

VanSoelen, W. (2007). *The field guide for powerline workers*. Florence, KY: Cengage Delmar Learning, Inc.

Journals and Magazines

Blatt, M. (2009, November–December). Optical communications for improving the performance and reliability of the smart grid. *Electric Energy T&D Magazine, 6*(13). Retrieved December 14, 2009, from http://www.electricenergyonline.com/?page=show_article&mag=60&article=461

Boyle, J. (2009). Aerial lifts. TailGate Safety Topics. Retrieved December 14, 2009, from http://www.incident-prevention.com/component/zine/article/108-aerial-lifts.html

Coveney, M. (2009, November–December). Helping utilities attain sustainability through 'Green IT'. *Electric Energy T&D Magazine, 6*(13). Retrieved December 14, 2009, from http://www.electricenergyonline.com/?page=show_article&mag=60&article=457

Shein, R. (2009, November–December). Security quality and smart grid: The utilities' dilemma. *Electric Energy T&D Magazine, 6*(13). Retrieved December 14, 2009, from http://www.electricenergyonline.com/?page=show_article&mag=60&article=460

Web Sites

Blackboard Academic Suite. (n.d.). Retrieved November 11, 2009, from http://rcu.blackboard.com/webapps/portal/frameset.jsp

Electric Energy Online (2009). *Electric Energy Magazine*, Jaguar Media Inc., Terrebonne, Quebec Canada. Retrieved December 3, 2009, from http://www.electricenergyonline.com/?page=home

E-School News. (n.d.). Retrieved November 12, 2009, from http://www.eschoolnews.com/news/top-news/index.cfm?i=50758

How stuff works. (n.d.). Retrieved November 11, 2009, from http://www.howstuffworks.com/

Kathy Schrock's guide for educators. (n.d.). In discovery education. Retrieved November 11, 2009, from http://school.discoveryeducation.com/schrockguide/

OSHA Instruction. (2003). Enforcement of the electric power generation, transmission, and distribution standard. Retrieved on December 14, 2009, from http://www.osha.gov/OshDoc/Directive_pdf/CPL_2-1_38.pdf

OSHA Construction Regulations. (September, 2008). Retrieved December 3, 2009, from http://www.osha.gov/SLTC/powergeneration/construction.html

Spears, R. (2003). The ruler game. Retrieved on November 11, 2009, from http://www.rickyspears.com/rulergame/

Teacher Vision. (n.d.). Retrieved November 11, 2009, from http://www.teachervision.fen.com/

Tech Learning. (n.d.). Retrieved November 11, 2009, from http://techlearning.com

Vocational Information Center. (n.d.). About vocational education. In Career and technical–vocational education. Retrieved November 11, 2009, from http://www.khake.com/page50.html

Course Name: Electrical Power and Transformer Banking for Line Workers

Course Abbreviation: ULT 1232

Classification: Career Elective

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. (2 sch: 1-hr lecture, 2-hr lab)

Prerequisite:

Pre/Co Requisite		
Fundamentals of Electricity for Line Workers (ULT 1192) **or** Fundamentals of Electricity (ELT 1192)	**OR**	By consent of instructor

Competencies and Suggested Objectives
1. Discuss safety and environmental protection concerns associated with electrical power equipment. (DOK1, ELT1.2) a. List safety precautions associated with motors and transformers. (DOK1) b. Explain the procedures for working with and disposing of hazardous materials. (DOK1)
2. Wire single and three phase electrical components. (DOK3, ELT1.4, ELT2.2, ELT3.7) a. Sketch and connect a single and three phase transformers including delta and wye and three-wire and four-wire systems. (DOK3)
4. Discuss troubleshooting techniques. (DOK1, ELT1.4, ELT2.2)
5. Discuss rotation and phasing. (DOK2, ELT1.4, ELT2.2)

STANDARDS

ELT1.2 Electrical Safety
ELT1.4 Electrical Theory
ELT2.2 Motors: Theory and Application
ELT3.7 Transformers

Related Academic Standards

R1 Interpret Graphic Information (forms, maps, reference sources)
R2 Words in Context (same and opposite meaning)
R3 Recall Information (details, sequence)
R4 Construct Meaning (main idea, summary/paraphrase, compare/contrast, cause/effect)
R5 Evaluate/Extend Meaning (fact/opinion, predict outcomes, point of view)
M1 Addition of Whole Numbers (no regrouping, regrouping)
M2 Subtraction of Whole Numbers (no regrouping, regrouping)
M3 Multiplication of Whole Numbers (no regrouping, regrouping)
M4 Division of Whole Numbers (no remainder, remainder)

M5 Decimals (addition, subtraction, multiplication, division)
M6 Fractions (addition, subtraction, multiplication, division)
M7 Integers (addition, subtraction, multiplication, division)
M8 Percents
M9 Algebraic Operations
A1 Numeration (ordering, place value, scientific notation)
A2 Number Theory (ratio, proportion)
A3 Data Interpretation (graph, table, chart, diagram)
A4 Pre-Algebra and Algebra (equations, inequality)
A5 Measurement (money, time, temperature, length, area, volume)
A6 Geometry (angles, Pythagorean theory)
A7 Computation in Context (whole numbers, decimals, fractions, algebraic operations)
A8 Estimation (rounding, estimation)
L1 Usage (pronoun, tense, subject/verb agreement, adjective, adverb)
L2 Sentence Formation (fragments, run-on, clarity)
L3 Paragraph Development (topic sentence, supporting sentence, sequence)
L4 Capitalization (proper noun, titles)
L5 Punctuation (comma, semicolon)
L6 Writing Conventions (quotation marks, apostrophe, parts of a letter)
S1 Vowel (short, long)
S2 Consonant (variant spelling, silent letter)
S3 Structural Unit (root, suffix)

21st Century Skills

CS1 Global Awareness
CS2 Financial, Economic, Business and Entrepreneurial Literacy
CS3 Civic Literacy
CS7 Critical Thinking and Problem Solving
CS8 Information and Communication Skills
CS9 Information Literacy
CS13 Initiative and Self-Direction

SUGGESTED REFERENCES

Burkart, M., McCann, M., & Paine, D. (2004). *Elevated work platforms and scaffolding*. New York, NY: McGraw-Hill Professional.

Carman, R. A., & Saunders, H. M. (2005). *Mathematics for the trades: A guided approach*. Upper Saddle River, NJ: Pearson Prentice Hall.

Cook, N. P. (2004). *Introductory mathematics*. Upper Saddle River, NJ: Pearson Prentice Hall.

Cook, N. P. (2004). *Mathematics for technical trades*. Upper Saddle River, NJ: Pearson Prentice Hall.

Harman, T. L. (2005). *Guide to the national electric code*. Upper Saddle River, NJ: Prentice Hall.

Hart, G. V. (2008). *Ugly's electrical references*. Houston, TX: Jones Bartlett Publishers.

Henry, T. (n.d.). *Dictionary for the electrician with formulas*. Winter Park, FL: Henry Publications.

Herman, S. L. (2007). *Alternating current fundamentals*. Florence, KY: Cengage Delmar Learning, Inc.

Herman, S. L. (2009). *Delmar's standard textbook of electricity*. Florence, KY: Cengage Delmar Learning, Inc.

Keljik, J. (2009). *Electricity 3: Power generation and delivery*. Florence, KY: Cengage Delmar Learning, Inc.

Keljik, J. (2009). *Electricity 4: AC/DC motors, controls, and maintenance*. Florence, KY: Cengage Delmar Learning, Inc.

Kubala, T. (2009). *Electricity 1: Devices, circuits, and materials*. Florence, KY: Cengage Delmar Learning, Inc.

Kubala, T. (2009). *Electricity 2: Devices, circuits, and materials*. Florence, KY: Cengage Delmar Learning, Inc.

MacDonald, J., Rossnagel, W., & Higgins, L. (2009). *Handbook of rigging*. New York, NY: McGraw-Hill Professional.

Marne, D. (2006, October). *National electrical safety code (NESC) handbook 2007* (2nd ed.). New York, NY: McGraw-Hill Professional.

Mazur, G. A., & Zurlis, P. A. (2003). *Electrical principles and practices*. Homewood, IL: American Technical.

Mullin, R. C., & Smith, R. L. (2005). *Electrical wiring commercial*. Clifton Park, NY: Delmar.

National Center for Construction Education and Research. (2009). *Core curriculum*. Upper Saddle River, NJ: Pearson Prentice Hall.

National Fire Protection Association. (2005). *National electric code*. Clifton Park, NY: Delmar.

Rockis, G., & Mazur, G. (2001). *Electrical motor controls*. Homewood, IL: American Technical.

Shoemaker, T., & Mack, J. (2007). *The lineman's and cableman's handbook* (11th ed.). New York, NY: McGraw-Hill Professional.

Shoemaker, T., & Mack, J. (2009). *The lineman and cableman's field manual* (2nd ed.). New York, NY: McGraw-Hill Professional.

Surbrook, T., & Althouse, J. (2005). *Interpreting the national electric code*. Clifton Park, NY: Delmar.

Titus, P. A., Titus, J. L., & Traister, J. (2002). *Illustrated dictionary for electrical workers*. Albany, NY: Delmar.

Trout, C. (2002). *Electrical installation and inspection*. Albany, NY: Delmar.

VanSoelen, W. (2006). *The guide for linemen and cablemen*. Florence, KY: Cengage Delmar Learning, Inc.

VanSoelen, W. (2007). *The field guide for powerline workers*. Florence, KY: Cengage Delmar Learning, Inc.

Journals and Magazines

Blatt, M. (2009, November–December). Optical communications for improving the performance and reliability of the smart grid. *Electric Energy T&D Magazine, 6*(13). Retrieved December 14, 2009, from http://www.electricenergyonline.com/?page=show_article&mag=60&article=461

Boyle, J. (2009). Aerial lifts. TailGate Safety Topics. Retrieved December 14, 2009, from http://www.incident-prevention.com/component/zine/article/108-aerial-lifts.html

Coveney, M. (2009, November–December). Helping utilities attain sustainability through 'Green IT'. *Electric Energy T&D Magazine, 6*(13). Retrieved December 14, 2009, from http://www.electricenergyonline.com/?page=show_article&mag=60&article=457

Shein, R. (2009, November–December). Security quality and smart grid: The utilities' dilemma. *Electric Energy T&D Magazine, 6*(13). Retrieved December 14, 2009, from http://www.electricenergyonline.com/?page=show_article&mag=60&article=460

Web Sites

Blackboard Academic Suite. (n.d.). Retrieved November 11, 2009, from http://rcu.blackboard.com/webapps/portal/frameset.jsp

Electric Energy Online (2009). Electric Energy Magazine, Jaguar Media Inc., Terrebonne, Quebec Canada. Retrieved December 3, 2009, from http://www.electricenergyonline.com/?page=home

E-School News. (n.d.). Retrieved November 12, 2009, from http://www.eschoolnews.com/news/top-news/index.cfm?i=50758

How stuff works. (n.d.). Retrieved November 11, 2009, from http://www.howstuffworks.com/

Kathy Schrock's guide for educators. (n.d.). In discovery education. Retrieved November 11, 2009, from http://school.discoveryeducation.com/schrockguide/

OSHA Instruction. (2003). Enforcement of the electric power generation, transmission, and distribution standard. Retrieved on December 14, 2009, from http://www.osha.gov/OshDoc/Directive_pdf/CPL_2-1_38.pdf

OSHA Construction Regulations. (September, 2008). Retrieved December 3, 2009, from http://www.osha.gov/SLTC/powergeneration/construction.html

Spears, R. (2003). The ruler game. Retrieved on November 11, 2009, from http://www.rickyspears.com/rulergame/

Teacher Vision. (n.d.). Retrieved November 11, 2009, from http://www.teachervision.fen.com/

Tech Learning. (n.d.). Retrieved November 11, 2009, from http://techlearning.com

Vocational Information Center. (n.d.). About vocational education. In Career and technical–vocational education. Retrieved November 11, 2009, from http://www.khake.com/page50.html

Course Name: Line Worker Truck Driving

Course Abbreviation: ULT 1313

Classification: Career Core

Description: This course is designed to provide a line worker with fundamental skills needed to obtain a Class A CDL (Commercial Drivers License) with air brake endorsement. (3 sch: 2-hr lecture, 2-hr lab)

Prerequisite: Consent of Instructor

Competencies and Suggested Objectives
1. Demonstrate the ability to discuss safety precautions in the operation of a DOT regulated combination vehicle with air brake endorsement. (DOK1, DTV1) a. Discuss rules of the road. (DOK1) b. Discuss precautions to take in driving during daylight and nighttime under various road conditions. (DOK1) c. Identify and discuss highway signs and the meaning of each. (DOK1) d. Discuss DOT rules and regulations. (DOK1)
2. Demonstrate the ability to plan a route and perform a pre-trip inspection. (DOK1, DTV1) a. Identify safety precautions needed prior to a trip. (DOK1) b. Discuss the procedures to follow prior to a trip. (DOK1) c. Perform a pre-trip inspection. (DOK1)
3. Demonstrate the ability to perform basic operations of the DOT regulated combination vehicle with air brake endorsement. (DOK2, DVT2) a. Safely couple and uncouple a DOT regulated combination vehicle with air brake endorsement. (DOK1) b. Upshift and downshift a manual truck transmission. (DOK2) c. Explain and demonstrate the use of rear and side mirrors while driving and safe spacing behind vehicles. (DOK1)
4. Safely perform maneuvers listed in the skills assessment as prescribed by MDOT of a combination vehicle. (DOK2, DTV3)
5. Obtain Class A CDL with air brake endorsement. (DOK2, DVT1, DVT2, DVT3)

STANDARDS

2006 Mississippi Professional Driver's Manual

DTV1 General Knowledge
DTV2 Air Brakes
DTV3 Combination Vehicles

Related Academic Standards

R1 Interpret Graphic Information (forms, maps, reference sources)
R2 Words in Context (same and opposite meaning)
R3 Recall Information (details, sequence)
R4 Construct Meaning (main idea, summary/paraphrase, compare/contrast, cause/effect)
R5 Evaluate/Extend Meaning (fact/opinion, predict outcomes, point of view)
M1 Addition of Whole Numbers (no regrouping, regrouping)
M2 Subtraction of Whole Numbers (no regrouping, regrouping)
M3 Multiplication of Whole Numbers (no regrouping, regrouping)
M4 Division of Whole Numbers (no remainder, remainder)
M5 Decimals (addition, subtraction, multiplication, division)
M6 Fractions (addition, subtraction, multiplication, division)
M7 Integers (addition, subtraction, multiplication, division)
M8 Percents
M9 Algebraic Operations
A1 Numeration (ordering, place value, scientific notation)
A2 Number Theory (ratio, proportion)
A3 Data Interpretation (graph, table, chart, diagram)
A4 Pre-Algebra and Algebra (equations, inequality)
A5 Measurement (money, time, temperature, length, area, volume)
A6 Geometry (angles, Pythagorean theory)
A7 Computation in Context (whole numbers, decimals, fractions, algebraic operations)
A8 Estimation (rounding, estimation)
L1 Usage (pronoun, tense, subject/verb agreement, adjective, adverb)
L2 Sentence Formation (fragments, run-on, clarity)
L3 Paragraph Development (topic sentence, supporting sentence, sequence)
L4 Capitalization (proper noun, titles)
L5 Punctuation (comma, semicolon)
L6 Writing Conventions (quotation marks, apostrophe, parts of a letter)
S1 Vowel (short, long)
S2 Consonant (variant spelling, silent letter)
S3 Structural Unit (root, suffix)

21st Century Skills

CS1 Global Awareness
CS2 Financial, Economic, Business and Entrepreneurial Literacy
CS3 Civic Literacy
CS7 Critical Thinking and Problem Solving
CS8 Information and Communication Skills
CS9 Information Literacy
CS13 Initiative and Self-Direction

SUGGESTED REFERENCES

Articles

Baxter, J. (2006, March). Going green, despite filter problems, biodiesel's popularity grows as its environmental and economic advantages become evident. *Overdrive,* 23-27.

Cox, D. (2005, August). Beat the heat drive at night, drink fluids and keep that a.c. running. *The Trucker*, 8-9.

Duncan, A. (2006, March). Taxation without perspiration. *Overdrive,* 45-47.

Grider, R. (2005, January). Regs, raises, and recorders. *Truckers News*, 10.

Hartley, P. (2006, March). How to: Maintain a fifth wheel. *Overdrive*, 53-56.

Record, K. (2005, January). Battle of the bugs. *Truckers News*, 36.

Schulz, J. (2006, May). Industry leaders urge heavier trucks (Graves says shippers modes must cooperate). *Transport Topics*, 1-2.

Journals

Overdrive. Tuscaloosa, AL: Randall-Reilly Publishing. Retrieved May 25, 2006, from http://www.overdriveonline.com

Transport Topics. Alexandria, VA: Transport Topics Publishing. Retrieved June 10, 2006, from http://www.TTNEWS.com

The Trucker. Little Rock, AR: Trucker Publications. Retrieved June 10, 2006, from http://www.thetrucker.com

Truckers News. Tuscaloosa, AL: Randall-Reilly Publishing. Retrieved May 25, 2006, from http://www.eTrucker.com

Texts

Hours of service & drivers logs workbook. (2003). Neenah, WI: J.J. Keller. ISBN 1-59042-377-1.

Trucking: Tractor-trailer driver. (2006). Clifton Park, NY: Thomson Delmar Learning. ISBN 1-4180-1262-9.

Videos

The Institute of Driver Behavior. (n.d.). *Backing safety*. (Available from The Institute of Driver Behavior, 1507 Tower Avenue Suite 209, Superior, WI 54880, 715-395-0404)

The Institute of Driver Behavior. (n.d.). *A driver's story*. (Available from The Institute of Driver Behavior, 1507 Tower Avenue Suite 209, Superior, WI 54880, 715-395-0404)

The Institute of Driver Behavior. (n.d.). *Driving ethics*. (Available from The Institute of Driver Behavior, 1507 Tower Avenue Suite 209, Superior, WI 54880, 715-395-0404)

The Institute of Driver Behavior. (n.d.). *Driving without awareness*. (Available from The Institute of Driver Behavior, 1507 Tower Avenue Suite 209, Superior, WI 54880, 715-395-0404)

The Institute of Driver Behavior. (n.d.). *The name of the game is position*. (Available from The Institute of Driver Behavior, 1507 Tower Avenue Suite 209, Superior, WI 54880, 715-395-0404)

The Institute of Driver Behavior. (n.d.). *Positioning for backing*. (Available from The Institute of Driver Behavior, 1507 Tower Avenue Suite 209, Superior, WI 54880, 715-395-0404)

The Institute of Driver Behavior. (n.d.). *Rollovers: The human factors*. (Available from The Institute of Driver Behavior, 1507 Tower Avenue Suite 209, Superior, WI 54880, 715-395-0404)

The Institute of Driver Behavior. (n.d.). *Safe sharks*. (Available from The Institute of Driver Behavior, 1507 Tower Avenue Suite 209, Superior, WI 54880, 715-395-0404)

The Institute of Driver Behavior. (n.d.). *Take your cue from us*. (Available from The Institute of Driver Behavior, 1507 Tower Avenue Suite 209, Superior, WI 54880, 715-395-0404)

The Institute of Driver Behavior. (n.d.). *Too fast for conditions*. (Available from The Institute of Driver Behavior, 1507 Tower Avenue Suite 209, Superior, WI 54880, 715-395-0404)

The Institute of Driver Behavior. (n.d.). *Training your eyes for expert driving*. (Available from The Institute of Driver Behavior, 1507 Tower Avenue Suite 209, Superior, WI 54880, 715-395-0404)

Keller, J.J. (n.d.). *Cargo securement.* (Available from J.J. Keller, 3003 W. Breezewood Lane, P.O. Box 368, Neenah, WI 54957, 1-800-327-6868)

Keller, J.J. (n.d.). *Coupling & uncoupling.* (Available from J.J. Keller, 3003 W. Breezewood Lane, P.O. Box 368, Neenah, WI 54957, 1-800-327-6868)

Keller, J.J. (n.d.). *Extreme driving conditions.* (Available from J.J. Keller, 3003 W. Breezewood Lane, P.O. Box 368, Neenah, WI 54957, 1-800-327-6868)

Keller, J.J. (n.d.). *Fire extinguisher use.* (Available from J.J. Keller, 3003 W. Breezewood Lane, P.O. Box 368, Neenah, WI 54957, 1-800-327-6868)

Keller, J.J. (n.d.). *Hazard perception.* (Available from J.J. Keller, 3003 W. Breezewood Lane, P.O. Box 368, Neenah, WI 54957, 1-800-327-6868)

Keller, J.J. (n.d.). *Night operation.* (Available from J.J. Keller, 3003 W. Breezewood Lane, P.O. Box 368, Neenah, WI 54957, 1-800-327-6868)

Keller, J.J. (n.d.). *Vehicle backing.* (Available from J.J. Keller, 3003 W. Breezewood Lane, P.O. Box 368, Neenah, WI 54957, 1-800-327-6868)

Web Sites

Crist CDL Training Center. Retrieved June 10, 2006, from http://www.cristcdl.com/index.shtml

J.J. Keller & Associates, Inc. Retrieved June 10, 2005, from http://www.jjkeller.com

MapQuest, Inc. Retrieved June 10, 2006, from http://www.mapquest.com

Swift Transportation. Retrieved June 10, 2006, from http://www.swifttrans.com/

Course Name: Truck Driving for Line Workers

Course Abbreviation: ULT 1324

Classification: AAS Core

Description: This course is designed to provide a line worker with fundamental skills needed to obtain a Class A CDL (Commercial Drivers License) with air brake endorsement. (4 sch:1-hr lecture, 6-hr lab)

Prerequisite: Consent of Instructor

Competencies and Suggested Objectives
1. Demonstrate the ability to discuss safety precautions in the operation of a DOT regulated combination vehicle with air brake endorsement. (DOK1, DTV1, DTV2) a. Discuss rules of the road. (DOK1) b. Discuss precautions to take in driving during daylight and nighttime under various road conditions. (DOK1) c. Identify and discuss highway signs and the meaning of each. (DOK1) d. Discuss DOT rules and regulations. (DOK1)
2. Demonstrate trip planning procedures. (DOK 1)
3. Demonstrate the ability to do a pre-trip inspection. (DOK1, DTV1) a. Identify safety precautions needed prior to a trip. (DOK1) b. Discuss the procedures to follow prior to a trip. (DOK1) c. Perform a pre-trip inspection. (DOK1)
4. Demonstrate the ability to perform basic operations of the DOT regulated combination vehicle with air brake endorsement. (DOK2, DTV3) a. Safely couple and uncouple a DOT regulated combination vehicle with air brake endorsement. (DOK1) b. Upshift and downshift a manual truck transmission. (DOK2) c. Explain and demonstrate the use of rear and side mirrors while driving. (DOK1) d. Explain and demonstrate the correct spacing behind vehicles. (DOK1) e. Park a combination vehicle. (DOK2)
5. Develop the ability to safely maneuver a combination vehicle. (DOK2, DTV3) a. Maneuver a combination through a 12-ft opening. (DOK2) b. Maneuver a combination through a left-hand turn at an intersection. (DOK2) c. Maneuver a combination through a right-hand turn at an intersection. (DOK2)
6. Obtain Class A CDL with air brake endorsement. (DOK2, DTV1, DTV2, DTV3)

STANDARDS

2006 Mississippi Professional Driver's Manual

DTV1 General Knowledge
DTV2 Air Brakes
DTV3 Combination Vehicles

Related Academic Standards

R1 Interpret Graphic Information (forms, maps, reference sources)
R2 Words in Context (same and opposite meaning)
R3 Recall Information (details, sequence)
R4 Construct Meaning (main idea, summary/paraphrase, compare/contrast, cause/effect)
R5 Evaluate/Extend Meaning (fact/opinion, predict outcomes, point of view)
M1 Addition of Whole Numbers (no regrouping, regrouping)
M2 Subtraction of Whole Numbers (no regrouping, regrouping)
M3 Multiplication of Whole Numbers (no regrouping, regrouping)
M4 Division of Whole Numbers (no remainder, remainder)
M5 Decimals (addition, subtraction, multiplication, division)
M6 Fractions (addition, subtraction, multiplication, division)
M7 Integers (addition, subtraction, multiplication, division)
M8 Percents
M9 Algebraic Operations
A1 Numeration (ordering, place value, scientific notation)
A2 Number Theory (ratio, proportion)
A3 Data Interpretation (graph, table, chart, diagram)
A4 Pre-Algebra and Algebra (equations, inequality)
A5 Measurement (money, time, temperature, length, area, volume)
A6 Geometry (angles, Pythagorean theory)
A7 Computation in Context (whole numbers, decimals, fractions, algebraic operations)
A8 Estimation (rounding, estimation)
L1 Usage (pronoun, tense, subject/verb agreement, adjective, adverb)
L2 Sentence Formation (fragments, run-on, clarity)
L3 Paragraph Development (topic sentence, supporting sentence, sequence)
L4 Capitalization (proper noun, titles)
L5 Punctuation (comma, semicolon)
L6 Writing Conventions (quotation marks, apostrophe, parts of a letter)
S1 Vowel (short, long)
S2 Consonant (variant spelling, silent letter)
S3 Structural Unit (root, suffix)

21st Century Skills

CS1 Global Awareness
CS2 Financial, Economic, Business and Entrepreneurial Literacy
CS3 Civic Literacy
CS7 Critical Thinking and Problem Solving
CS8 Information and Communication Skills
CS9 Information Literacy
CS13 Initiative and Self-Direction

SUGGESTED REFERENCES

Articles

Baxter, J. (2006, March). Going green, despite filter problems, biodiesel's popularity grows as its environmental and economic advantages become evident. *Overdrive*, 23-27.

Cox, D. (2005, August). Beat the heat drive at night, drink fluids and keep that a.c. running. *The Trucker*, 8-9.

Duncan, A. (2006, March). Taxation without perspiration. *Overdrive*, 45-47.

Grider, R. (2005, January). Regs, raises and recorders. *Truckers News*, 10.

Hartley, P. (2006, March). How to: Maintain a fifth wheel. *Overdrive*, 53-56.

Record, K. (2005, January). Battle of the bugs. *Truckers News*, 36.

Schulz, J. (2006, May). Industry leaders urge heavier trucks (Graves says shippers modes must cooperate). *Transport Topics*, 1-2.

Journals

Overdrive. Tuscaloosa, AL: Randall-Reilly Publishing. Retrieved May 25, 2006, from http://www.overdriveonline.com

Transport Topics. Alexandria, VA: Transport Topics Publishing. Retrieved June 10, 2006, from http://www.TTNEWS.com

The Trucker. Little Rock, AR: Trucker Publications. Retrieved June 10, 2006, from http://www.thetrucker.com

Truckers News. Tuscaloosa, AL: Randall-Reilly Publishing. Retrieved May 25, 2006, from http://www.eTrucker.com

Texts

Hours of service & drivers logs workbook. (2003). Neenah, WI: J.J. Keller. ISBN 1-59042-377-1.

Trucking: Tractor-trailer driver. (2006). Clifton Park, NY: Thomson Delmar Learning. ISBN 1-4180-1262-9.

Videos

The Institute of Driver Behavior. (n.d.). *Backing safety*. (Available from The Institute of Driver Behavior, 1507 Tower Avenue Suite 209, Superior, WI 54880, 715-395-0404)

The Institute of Driver Behavior. (n.d.). *A driver's story*. (Available from The Institute of Driver Behavior, 1507 Tower Avenue Suite 209, Superior, WI 54880, 715-395-0404)

The Institute of Driver Behavior. (n.d.). *Driving ethics*. (Available from The Institute of Driver Behavior, 1507 Tower Avenue Suite 209, Superior, WI 54880, 715-395-0404)

The Institute of Driver Behavior. (n.d.). *Driving without awareness*. (Available from The Institute of Driver Behavior, 1507 Tower Avenue Suite 209, Superior, WI 54880, 715-395-0404)

The Institute of Driver Behavior. (n.d.). *The name of the game is position*. (Available from The Institute of Driver Behavior, 1507 Tower Avenue Suite 209, Superior, WI 54880, 715-395-0404)

The Institute of Driver Behavior. (n.d.). *Positioning for backing*. (Available from The Institute of Driver Behavior, 1507 Tower Avenue Suite 209, Superior, WI 54880, 715-395-0404)

The Institute of Driver Behavior. (n.d.). *Rollovers: The human factors*. (Available from The Institute of Driver Behavior, 1507 Tower Avenue Suite 209, Superior, WI 54880, 715-395-0404)

The Institute of Driver Behavior. (n.d.). *Safe sharks*. (Available from The Institute of Driver Behavior, 1507 Tower Avenue Suite 209, Superior, WI 54880, 715-395-0404)

The Institute of Driver Behavior. (n.d.). *Take your cue from us*. (Available from The Institute of Driver Behavior, 1507 Tower Avenue Suite 209, Superior, WI 54880, 715-395-0404)

The Institute of Driver Behavior. (n.d.). *Too fast for conditions*. (Available from The Institute of Driver Behavior, 1507 Tower Avenue Suite 209, Superior, WI 54880, 715-395-0404)

The Institute of Driver Behavior. (n.d.). *Training your eyes for expert driving*. (Available from The Institute of Driver Behavior, 1507 Tower Avenue Suite 209, Superior, WI 54880, 715-395-0404)

Keller, J.J. (n.d.). *Cargo securement.* (Available from J.J. Keller, 3003 W. Breezewood Lane, P.O. Box 368, Neenah, WI 54957, 1-800-327-6868)

Keller, J.J. (n.d.). *Coupling & uncoupling.* (Available from J.J. Keller, 3003 W. Breezewood Lane, P.O. Box 368, Neenah, WI 54957, 1-800-327-6868)

Keller, J.J. (n.d.). *Extreme driving conditions.* (Available from J.J. Keller, 3003 W. Breezewood Lane, P.O. Box 368, Neenah, WI 54957, 1-800-327-6868)

Keller, J.J. (n.d.). *Fire extinguisher use.* (Available from J.J. Keller, 3003 W. Breezewood Lane, P.O. Box 368, Neenah, WI 54957, 1-800-327-6868)

Keller, J.J. (n.d.). *Hazard perception.* (Available from J.J. Keller, 3003 W. Breezewood Lane, P.O. Box 368, Neenah, WI 54957, 1-800-327-6868)

Keller, J.J. (n.d.). *Night operation.* (Available from J.J. Keller, 3003 W. Breezewood Lane, P.O. Box 368, Neenah, WI 54957, 1-800-327-6868)

Keller, J.J. (n.d.). *Vehicle backing.* (Available from J.J. Keller, 3003 W. Breezewood Lane, P.O. Box 368, Neenah, WI 54957, 1-800-327-6868)

Web Sites

Crist CDL Training Center. Retrieved June 10, 2006, from http://www.cristcdl.com/index.shtml

J.J. Keller & Associates, Inc. Retrieved June 10, 2005, from http://www.jjkeller.com

MapQuest, Inc. Retrieved June 10, 2006, from http://www.mapquest.com

Swift Transportation. Retrieved June 10, 2006, from http://www.swifttrans.com/

Course Name: Basic Utility Equipment Operation

Course Abbreviation: ULT 1333

Classification: Career Elective, AAS Core

Description: This course is designed to prepare students in the basic operation of line worker equipment. (3 sch: 2-hr lecture, 2-hr lab)

Prerequisite: None

Competencies and Suggested Objectives
1. Demonstrate the safe use and operation of an aerial lift truck. (DOK2, UPP, VWP, MAN, UPT, CLC, SLG, GRD)
2. Demonstrate the safe use and operation of a digger derrick. (DOK2, UPP, VWP, MAN, UPT, CLC, SLG, GRD)
3. Demonstrate the safe use and operation of a fork lift. (DOK2, MHE)
4. Demonstrate the safe use and operation of a chain saw. (DOK2, MEC)
5. Demonstrate the safe use and operation of an ATV/RTV/UTV. (DOK1, MEC)

STANDARDS

Specific standards for this course will depend upon the nature of the problem under investigation.

UPP Powered platforms, manlifts, and vehicle-mounted work platforms 1910 Subpart F
VWP Vehicle-mounted elevating and rotating work platforms 1910.67
MAN Manlifts 1910.68
UPT Powered industrial trucks 1910.178
CLC Crawler locomotive and truck cranes 1910.180
SLG Slings 1910.184
MHE Material handling equipment 1926.602
URG Rigging equipment for material handling 1926.251
MEC Mechanical equipment 1926.952
CMH Material handling 1926.953
GRD Grounding for protection of employees 1926.954

Related Academic Standards

R1 Interpret Graphic Information (forms, maps, reference sources)
R2 Words in Context (same and opposite meaning)
R3 Recall Information (details, sequence)
R4 Construct Meaning (main idea, summary/paraphrase, compare/contrast, cause/effect)
R5 Evaluate/Extend Meaning (fact/opinion, predict outcomes, point of view)
M1 Addition of Whole Numbers (no regrouping, regrouping)

M2 Subtraction of Whole Numbers (no regrouping, regrouping)
M3 Multiplication of Whole Numbers (no regrouping, regrouping)
M4 Division of Whole Numbers (no remainder, remainder)
M5 Decimals (addition, subtraction, multiplication, division)
M6 Fractions (addition, subtraction, multiplication, division)
M7 Integers (addition, subtraction, multiplication, division)
M8 Percents
M9 Algebraic Operations
A1 Numeration (ordering, place value, scientific notation)
A2 Number Theory (ratio, proportion)
A3 Data Interpretation (graph, table, chart, diagram)
A4 Pre-Algebra and Algebra (equations, inequality)
A5 Measurement (money, time, temperature, length, area, volume)
A6 Geometry (angles, Pythagorean theory)
A7 Computation in Context (whole numbers, decimals, fractions, algebraic operations)
A8 Estimation (rounding, estimation)
L1 Usage (pronoun, tense, subject/verb agreement, adjective, adverb)
L2 Sentence Formation (fragments, run-on, clarity)
L3 Paragraph Development (topic sentence, supporting sentence, sequence)
L4 Capitalization (proper noun, titles)
L5 Punctuation (comma, semicolon)
L6 Writing Conventions (quotation marks, apostrophe, parts of a letter)
S1 Vowel (short, long)
S2 Consonant (variant spelling, silent letter)
S3 Structural Unit (root, suffix)

21st Century Skills

CS1 Global Awareness
CS2 Financial, Economic, Business and Entrepreneurial Literacy
CS3 Civic Literacy
CS7 Critical Thinking and Problem Solving
CS8 Information and Communication Skills
CS9 Information Literacy
CS13 Initiative and Self-Direction

SUGGESTED REFERENCES

Burkart, M., McCann, M., & Paine, D. (2004). *Elevated work platforms and scaffolding*. New York, NY: McGraw-Hill Professional.

Carman, R. A., & Saunders, H. M. (2005). *Mathematics for the trades: A guided approach*. Upper Saddle River, NJ: Pearson Prentice Hall.

Cook, N. P. (2004). *Introductory mathematics*. Upper Saddle River, NJ: Pearson Prentice Hall.

Cook, N. P. (2004). *Mathematics for technical trades*. Upper Saddle River, NJ: Pearson Prentice Hall.

Harman, T. L. (2005). *Guide to the national electric code*. Upper Saddle River, NJ: Prentice Hall.

Hart, G. V. (2008). *Ugly's electrical references*. Houston, TX: Jones Bartlett Publishers.

Henry, T. (n.d.). *Dictionary for the electrician with formulas*. Winter Park, FL: Henry Publications.

Herman, S. L. (2007). *Alternating current fundamentals*. Florence, KY: Cengage Delmar Learning, Inc.

Herman, S. L. (2009). *Delmar's standard textbook of electricity*. Florence, KY: Cengage Delmar Learning, Inc.

Keljik, J. (2009). *Electricity 3: Power generation and delivery*. Florence, KY: Cengage Delmar Learning, Inc.

Keljik, J. (2009). *Electricity 4: AC/DC motors, controls, and maintenance*. Florence, KY: Cengage Delmar Learning, Inc.

Kubala, T. (2009). *Electricity 1: Devices, circuits, and materials*. Florence, KY: Cengage Delmar Learning, Inc.

Kubala, T. (2009). *Electricity 2: Devices, circuits, and materials*. Florence, KY: Cengage Delmar Learning, Inc.

MacDonald, J., Rossnagel, W., & Higgins, L. (2009). *Handbook of rigging*. New York, NY: McGraw-Hill Professional.

Marne, D. (2006, October). *National electrical safety code (NESC) handbook 2007* (2nd ed.). New York, NY: McGraw-Hill Professional.

Mazur, G. A., & Zurlis, P. A. (2003). *Electrical principles and practices*. Homewood, IL: American Technical.

Mullin, R. C., & Smith, R. L. (2005). *Electrical wiring commercial*. Clifton Park, NY: Delmar.

National Center for Construction Education and Research. (2009). *Core curriculum*. Upper Saddle River, NJ: Pearson Prentice Hall.

National Fire Protection Association. (2005). *National electric code*. Clifton Park, NY: Delmar.

Rockis, G., & Mazur, G. (2001). *Electrical motor controls*. Homewood, IL: American Technical.

Shoemaker, T., & Mack, J. (2007). *The lineman's and cableman's handbook* (11th ed.). New York, NY: McGraw-Hill Professional.

Shoemaker, T., & Mack, J. (2009). *The lineman and cableman's field manual* (2nd ed.). New York, NY: McGraw-Hill Professional.

Surbrook, T., & Althouse, J. (2005). *Interpreting the national electric code*. Clifton Park, NY: Delmar.

Titus, P. A., Titus, J. L., & Traister, J. (2002). *Illustrated dictionary for electrical workers*. Albany, NY: Delmar.

Trout, C. (2002). *Electrical installation and inspection*. Albany, NY: Delmar.

VanSoelen, W. (2006). *The guide for linemen and cablemen*. Florence, KY: Cengage Delmar Learning, Inc.

VanSoelen, W. (2007). *The field guide for powerline workers*. Florence, KY: Cengage Delmar Learning, Inc.

Journals and Magazines

Blatt, M. (2009, November–December). Optical communications for improving the performance and reliability of the smart grid. *Electric Energy T&D Magazine, 6*(13). Retrieved December 14, 2009, from http://www.electricenergyonline.com/?page=show_article&mag=60&article=461

Boyle, J. (2009). Aerial lifts. TailGate Safety Topics. Retrieved December 14, 2009, from http://www.incident-prevention.com/component/zine/article/108-aerial-lifts.html

Coveney, M. (2009, November–December). Helping utilities attain sustainability through 'Green IT'. *Electric Energy T&D Magazine, 6*(13). Retrieved December 14, 2009, from http://www.electricenergyonline.com/?page=show_article&mag=60&article=457

Shein, R. (2009, November–December). Security quality and smart grid: The utilities' dilemma. *Electric Energy T&D Magazine, 6*(13). Retrieved December 14, 2009, from http://www.electricenergyonline.com/?page=show_article&mag=60&article=460

Web Sites

Blackboard Academic Suite. (n.d.). Retrieved November 11, 2009, from http://rcu.blackboard.com/webapps/portal/frameset.jsp

Electric Energy Online (2009). *Electric Energy Magazine*, Jaguar Media Inc., Terrebonne, Quebec Canada. Retrieved December 3, 2009, from http://www.electricenergyonline.com/?page=home

E-School News. (n.d.). Retrieved November 12, 2009, from http://www.eschoolnews.com/news/top-news/index.cfm?i=50758

How stuff works. (n.d.). Retrieved November 11, 2009, from http://www.howstuffworks.com/

Kathy Schrock's guide for educators. (n.d.). In discovery education. Retrieved November 11, 2009, from http://school.discoveryeducation.com/schrockguide/

OSHA Instruction. (2003). Enforcement of the electric power generation, transmission, and distribution standard. Retrieved on December 14, 2009, from http://www.osha.gov/OshDoc/Directive_pdf/CPL_2-1_38.pdf

OSHA Construction Regulations. (September, 2008). Retrieved December 3, 2009, from http://www.osha.gov/SLTC/powergeneration/construction.html

Spears, R. (2003). The ruler game. Retrieved on November 11, 2009, from http://www.rickyspears.com/rulergame/

Teacher Vision. (n.d.). Retrieved November 11, 2009, from http://www.teachervision.fen.com/

Tech Learning. (n.d.). Retrieved November 11, 2009, from http://techlearning.com

Vocational Information Center. (n.d.). About vocational education. In Career and technical–vocational education. Retrieved November 11, 2009, from http://www.khake.com/page50.html

Course Name: Pole Climbing

Course Abbreviation: ULT 1413

Classification: Career - AAS Core

Description: This course is designed to provide a line worker with fundamental skills needed to perform basic pole climbing. (3 sch: 1-hr lecture, 4-hr lab)

Prerequisite: Consent of the instructor

Competencies and Suggested Objectives
1. Discuss and demonstrate use and inspection of pole climbing equipment. (DOK1)
2. Demonstrate pole climbing skills as prescribed by industry to include 100% fall protection. (DOK2)
3. Discuss and demonstrate proper pole inspection procedures. (DOK1)
4. Demonstrate the proper method of sharpening gaffs. (DOK1)
5. Demonstrate pole top rescue. (DOK2)

STANDARDS

Specific standards for this course will depend upon the nature of the problem under investigation.

Related Academic Standards

R1 Interpret Graphic Information (forms, maps, reference sources)
R2 Words in Context (same and opposite meaning)
R3 Recall Information (details, sequence)
R4 Construct Meaning (main idea, summary/paraphrase, compare/contrast, cause/effect)
R5 Evaluate/Extend Meaning (fact/opinion, predict outcomes, point of view)
M1 Addition of Whole Numbers (no regrouping, regrouping)
M2 Subtraction of Whole Numbers (no regrouping, regrouping)
M3 Multiplication of Whole Numbers (no regrouping, regrouping)
M4 Division of Whole Numbers (no remainder, remainder)
M5 Decimals (addition, subtraction, multiplication, division)
M6 Fractions (addition, subtraction, multiplication, division)
M7 Integers (addition, subtraction, multiplication, division)
M8 Percents
M9 Algebraic Operations
A1 Numeration (ordering, place value, scientific notation)
A2 Number Theory (ratio, proportion)
A3 Data Interpretation (graph, table, chart, diagram)
A4 Pre-Algebra and Algebra (equations, inequality)
A5 Measurement (money, time, temperature, length, area, volume)
A6 Geometry (angles, Pythagorean theory)

A7 Computation in Context (whole numbers, decimals, fractions, algebraic operations)
A8 Estimation (rounding, estimation)
L1 Usage (pronoun, tense, subject/verb agreement, adjective, adverb)
L2 Sentence Formation (fragments, run-on, clarity)
L3 Paragraph Development (topic sentence, supporting sentence, sequence)
L4 Capitalization (proper noun, titles)
L5 Punctuation (comma, semicolon)
L6 Writing Conventions (quotation marks, apostrophe, parts of a letter)
S1 Vowel (short, long)
S2 Consonant (variant spelling, silent letter)
S3 Structural Unit (root, suffix)

21st Century Skills

CS1 Global Awareness
CS2 Financial, Economic, Business and Entrepreneurial Literacy
CS3 Civic Literacy
CS7 Critical Thinking and Problem Solving
CS8 Information and Communication Skills
CS9 Information Literacy
CS13 Initiative and Self-Direction

SUGGESTED REFERENCES

Burkart, M., McCann, M., & Paine, D. (2004). *Elevated work platforms and scaffolding*. New York, NY: McGraw-Hill Professional.

Carman, R. A., & Saunders, H. M. (2005). *Mathematics for the trades: A guided approach*. Upper Saddle River, NJ: Pearson Prentice Hall.

Cook, N. P. (2004). *Introductory mathematics*. Upper Saddle River, NJ: Pearson Prentice Hall.

Cook, N. P. (2004). *Mathematics for technical trades*. Upper Saddle River, NJ: Pearson Prentice Hall.

Harman, T. L. (2005). *Guide to the national electric code*. Upper Saddle River, NJ: Prentice Hall.

Hart, G. V. (2008). *Ugly's electrical references*. Houston, TX: Jones $ Bartlett Publishers.

Henry, T. (n.d.). *Dictionary for the electrician with formulas*. Winter Park, FL: Henry Publications.

Herman, S. L. (2007). *Alternating current fundamentals*. Florence, KY: Cengage Delmar Learning, Inc.

Herman, S. L. (2009). *Delmar's standard textbook of electricity*. Florence, KY: Cengage Delmar Learning, Inc.

Keljik, J. (2009). *Electricity 3: Power generation and delivery*. Florence, KY: Cengage Delmar Learning, Inc.

Keljik, J. (2009). *Electricity 4: AC/DC motors, controls, and maintenance*. Florence, KY: Cengage Delmar Learning, Inc.

Kubala, T. (2009). *Electricity 1: Devices, circuits, and materials*. Florence, KY: Cengage Delmar Learning, Inc.

Kubala, T. (2009). *Electricity 2: Devices, circuits, and materials*. Florence, KY: Cengage Delmar Learning, Inc.

MacDonald, J., Rossnagel, W., & Higgins, L. (2009). *Handbook of rigging*. New York, NY: McGraw-Hill Professional.

Marne, D. (2006, October). *National electrical safety code (NESC) handbook 2007* (2nd ed.). New York, NY: McGraw-Hill Professional.

Mazur, G. A., & Zurlis, P. A. (2003). *Electrical principles and practices*. Homewood, IL: American Technical.

Mullin, R. C., & Smith, R. L. (2005). *Electrical wiring commercial*. Clifton Park, NY: Delmar.

National Center for Construction Education and Research. (2009). *Core curriculum*. Upper Saddle River, NJ: Pearson Prentice Hall.

National Fire Protection Association. (2005). *National electric code*. Clifton Park, NY: Delmar.

Rockis, G., & Mazur, G. (2001). *Electrical motor controls*. Homewood, IL: American Technical.

Shoemaker, T., & Mack, J. (2007). *The lineman's and cableman's handbook* (11th ed.). New York, NY: McGraw-Hill Professional.

Shoemaker, T., & Mack, J. (2009). *The lineman and cableman's field manual* (2nd ed.). New York, NY: McGraw-Hill Professional.

Surbrook, T., & Althouse, J. (2005). *Interpreting the national electric code*. Clifton Park, NY: Delmar.

Titus, P. A., Titus, J. L., & Traister, J. (2002). *Illustrated dictionary for electrical workers*. Albany, NY: Delmar.

Trout, C. (2002). *Electrical installation and inspection*. Albany, NY: Delmar.

VanSoelen, W. (2006). *The guide for linemen and cablemen*. Florence, KY: Cengage Delmar Learning, Inc.

VanSoelen, W. (2007). *The field guide for powerline workers*. Florence, KY: Cengage Delmar Learning, Inc.

Journals and Magazines

Blatt, M. (2009, November–December). Optical communications for improving the performance and reliability of the smart grid. *Electric Energy T&D Magazine, 6*(13). Retrieved December 14, 2009, from http://www.electricenergyonline.com/?page=show_article&mag=60&article=461

Boyle, J. (2009). Aerial lifts. TailGate Safety Topics. Retrieved December 14, 2009, from http://www.incident-prevention.com/component/zine/article/108-aerial-lifts.html

Coveney, M. (2009, November–December). Helping utilities attain sustainability through 'Green IT'. *Electric Energy T&D Magazine*, *6*(13). Retrieved December 14, 2009, from http://www.electricenergyonline.com/?page=show_article&mag=60&article=457

Shein, R. (2009, November–December). Security quality and smart grid: The utilities' dilemma. *Electric Energy T&D Magazine, 6*(13). Retrieved December 14, 2009, from http://www.electricenergyonline.com/?page=show_article&mag=60&article=460

Web Sites

Blackboard Academic Suite. (n.d.). Retrieved November 11, 2009, from http://rcu.blackboard.com/webapps/portal/frameset.jsp

Electric Energy Online (2009). *Electric Energy Magazine*, Jaguar Media Inc., Terrebonne, Quebec Canada. Retrieved December 3, 2009, from http://www.electricenergyonline.com/?page=home

E-School News. (n.d.). Retrieved November 12, 2009, from http://www.eschoolnews.com/news/top-news/index.cfm?i=50758

How stuff works. (n.d.). Retrieved November 11, 2009, from http://www.howstuffworks.com/

Kathy Schrock's guide for educators. (n.d.). In discovery education. Retrieved November 11, 2009, from http://school.discoveryeducation.com/schrockguide/

OSHA Instruction. (2003). Enforcement of the electric power generation, transmission, and distribution standard. Retrieved on December 14, 2009, from http://www.osha.gov/OshDoc/Directive_pdf/CPL_2-1_38.pdf

OSHA Construction Regulations. (September, 2008). Retrieved December 3, 2009, from http://www.osha.gov/SLTC/powergeneration/construction.html

Spears, R. (2003). The ruler game. Retrieved on November 11, 2009, from http://www.rickyspears.com/rulergame/

Teacher Vision. (n.d.). Retrieved November 11, 2009, from http://www.teachervision.fen.com/

Tech Learning. (n.d.). Retrieved November 11, 2009, from http://techlearning.com

Vocational Information Center. (n.d.). About vocational education. In Career and technical–vocational education. Retrieved November 11, 2009, from http://www.khake.com/page50.html

Course Name: Overhead, Underground, and Substation Construction

Course Abbreviation: ULT 1514

Classification: Career Core

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. (4 sch: 2-hr lecture, 4-hr lab)

Pre/Co Requisite		
Pole Climbing (ULT 1413)	**OR**	By consent of instructor

Competencies and Suggested Objectives
1. Apply industry standard specifications, materials, framing, and tool nomenclature for power system construction. (DOK2, UPP, GTD, SER, RPS, MHE, URG, GRD, OVL, UGL, SUB)
2. Demonstrate framing and working on poles up to full height. (DOK2, UPP, GTD, SER, RPS, MHE,URG, GRD, OVL, SUB)
3. Demonstrate transformer change out. (DOK2, UPP, GTD, RPS, MHE, URG, GRD, OVL, UGL, SUB) a. Demonstrate rigging for transformer change out. (DOK2) b. Demonstrate proper equipment lifting. (DOK2) c. Demonstrate proper rope and knot tying techniques. (DOK2)
4. Demonstrate proper protective grounding procedures for power systems. (DOK1, UPP, GTD, SER, RPS, MHE, URG, GRD, OVL, UGL, SUB)
5. Discuss various types of devices used in substation construction. (DOK2, UPP, GTD, SER, RPS, MHE, URG, GRD, OVL, UGL, SUB)
6. Discuss the makeup of outdoor termination, elbows, and splices. (DOK1, UPP, GTD, SER, RPS, MHE, URG, GRD, OVL, UGL, SUB)
7. Discuss the fault finding techniques and various repairs. (DOK1, UPP, GTD, SER, RPS, MHE, URG, GRD, OVL, UGL, SUB)

STANDARDS

UPP	Powered platforms, manlifts, and vehicle-mounted work platforms
GTD	Electric Power Generation, Transmission, and Distribution 1910.269
SER	Specific excavation requirements 1926.651
RPS	Requirements for protective systems 1926.652
MHE	Material handling equipment 1926.602
URG	Rigging equipment for material handling 1926.251
GRD	Grounding for protection of employees 1926.954
OVL	Overhead lines 1926.955
UGL	Underground lines 1926.956
SUB	Construction in energized substations 1926.957

Related Academic Standards

R1 Interpret Graphic Information (forms, maps, reference sources)
R2 Words in Context (same and opposite meaning)
R3 Recall Information (details, sequence)
R4 Construct Meaning (main idea, summary/paraphrase, compare/contrast, cause/effect)
R5 Evaluate/Extend Meaning (fact/opinion, predict outcomes, point of view)
M1 Addition of Whole Numbers (no regrouping, regrouping)
M2 Subtraction of Whole Numbers (no regrouping, regrouping)
M3 Multiplication of Whole Numbers (no regrouping, regrouping)
M4 Division of Whole Numbers (no remainder, remainder)
M5 Decimals (addition, subtraction, multiplication, division)
M6 Fractions (addition, subtraction, multiplication, division)
M7 Integers (addition, subtraction, multiplication, division)
M8 Percents
M9 Algebraic Operations
A1 Numeration (ordering, place value, scientific notation)
A2 Number Theory (ratio, proportion)
A3 Data Interpretation (graph, table, chart, diagram)
A4 Pre-Algebra and Algebra (equations, inequality)
A5 Measurement (money, time, temperature, length, area, volume)
A6 Geometry (angles, Pythagorean theory)
A7 Computation in Context (whole numbers, decimals, fractions, algebraic operations)
A8 Estimation (rounding, estimation)
L1 Usage (pronoun, tense, subject/verb agreement, adjective, adverb)
L2 Sentence Formation (fragments, run-on, clarity)
L3 Paragraph Development (topic sentence, supporting sentence, sequence)
L4 Capitalization (proper noun, titles)
L5 Punctuation (comma, semicolon)
L6 Writing Conventions (quotation marks, apostrophe, parts of a letter)
S1 Vowel (short, long)
S2 Consonant (variant spelling, silent letter)
S3 Structural Unit (root, suffix)

21st Century Skills

CS1 Global Awareness
CS2 Financial, Economic, Business and Entrepreneurial Literacy
CS3 Civic Literacy
CS7 Critical Thinking and Problem Solving
CS8 Information and Communication Skills
CS9 Information Literacy
CS13 Initiative and Self-Direction

SUGGESTED REFERENCES

Burkart, M., McCann, M., & Paine, D. (2004). *Elevated work platforms and scaffolding*. New York, NY: McGraw-Hill Professional.

Carman, R. A., & Saunders, H. M. (2005). *Mathematics for the trades: A guided approach*. Upper Saddle River, NJ: Pearson Prentice Hall.

Cook, N. P. (2004). *Introductory mathematics*. Upper Saddle River, NJ: Pearson Prentice Hall.

Cook, N. P. (2004). *Mathematics for technical trades*. Upper Saddle River, NJ: Pearson Prentice Hall.

Harman, T. L. (2005). *Guide to the national electric code*. Upper Saddle River, NJ: Prentice Hall.

Hart, G. V. (2008). *Ugly's electrical references*. Houston, TX: Jones Bartlett Publishers.

Henry, T. (n.d.). *Dictionary for the electrician with formulas*. Winter Park, FL: Henry Publications.

Herman, S. L. (2007). *Alternating current fundamentals*. Florence, KY: Cengage Delmar Learning, Inc.

Herman, S. L. (2009). *Delmar's standard textbook of electricity*. Florence, KY: Cengage Delmar Learning, Inc.

Keljik, J. (2009). *Electricity 3: Power generation and delivery*. Florence, KY: Cengage Delmar Learning, Inc.

Keljik, J. (2009). *Electricity 4: AC/DC motors, controls, and maintenance*. Florence, KY: Cengage Delmar Learning, Inc.

Kubala, T. (2009). *Electricity 1: Devices, circuits, and materials*. Florence, KY: Cengage Delmar Learning, Inc.

Kubala, T. (2009). *Electricity 2: Devices, circuits, and materials*. Florence, KY: Cengage Delmar Learning, Inc.

MacDonald, J., Rossnagel, W., & Higgins, L. (2009). *Handbook of rigging*. New York, NY: McGraw-Hill Professional.

Marne, D. (2006, October). *National electrical safety code (NESC) handbook 2007* (2nd ed.). New York, NY: McGraw-Hill Professional.

Mazur, G. A., & Zurlis, P. A. (2003). *Electrical principles and practices*. Homewood, IL: American Technical.

Mullin, R. C., & Smith, R. L. (2005). *Electrical wiring commercial*. Clifton Park, NY: Delmar.

National Center for Construction Education and Research. (2009). *Core curriculum*. Upper Saddle River, NJ: Pearson Prentice Hall.

National Fire Protection Association. (2005). *National electric code*. Clifton Park, NY: Delmar.

Rockis, G., & Mazur, G. (2001). *Electrical motor controls*. Homewood, IL: American Technical.

Shoemaker, T., & Mack, J. (2007). *The lineman's and cableman's handbook* (11th ed.). New York, NY: McGraw-Hill Professional.

Shoemaker, T., & Mack, J. (2009). *The lineman and cableman's field manual* (2nd ed.). New York, NY: McGraw-Hill Professional.

Surbrook, T., & Althouse, J. (2005). *Interpreting the national electric code*. Clifton Park, NY: Delmar.

Titus, P. A., Titus, J. L., & Traister, J. (2002). *Illustrated dictionary for electrical workers*. Albany, NY: Delmar.

Trout, C. (2002). *Electrical installation and inspection*. Albany, NY: Delmar.

VanSoelen, W. (2006). *The guide for linemen and cablemen*. Florence, KY: Cengage Delmar Learning, Inc.

VanSoelen, W. (2007). *The field guide for powerline workers*. Florence, KY: Cengage Delmar Learning, Inc.

Journals and Magazines

Blatt, M. (2009, November–December). Optical communications for improving the performance and reliability of the smart grid. *Electric Energy T&D Magazine, 6*(13). Retrieved December 14, 2009, from http://www.electricenergyonline.com/?page=show_article&mag=60&article=461

Boyle, J. (2009). Aerial lifts. TailGate Safety Topics. Retrieved December 14, 2009, from http://www.incident-prevention.com/component/zine/article/108-aerial-lifts.html

Coveney, M. (2009, November–December). Helping utilities attain sustainability through 'Green IT'. *Electric Energy T&D Magazine*, *6*(13). Retrieved December 14, 2009, from http://www.electricenergyonline.com/?page=show_article&mag=60&article=457

Shein, R. (2009, November–December). Security quality and smart grid: The utilities' dilemma. *Electric Energy T&D Magazine, 6*(13). Retrieved December 14, 2009, from http://www.electricenergyonline.com/?page=show_article&mag=60&article=460

Web Sites

Blackboard Academic Suite. (n.d.). Retrieved November 11, 2009, from http://rcu.blackboard.com/webapps/portal/frameset.jsp

Electric Energy Online (2009). *Electric Energy Magazine*, Jaguar Media Inc., Terrebonne, Quebec Canada. Retrieved December 3, 2009, from http://www.electricenergyonline.com/?page=home

E-School News. (n.d.). Retrieved November 12, 2009, from http://www.eschoolnews.com/news/top-news/index.cfm?i=50758

How stuff works. (n.d.). Retrieved November 11, 2009, from http://www.howstuffworks.com/

Kathy Schrock's guide for educators. (n.d.). In discovery education. Retrieved November 11, 2009, from http://school.discoveryeducation.com/schrockguide/

OSHA Instruction. (2003). Enforcement of the electric power generation, transmission, and distribution standard. Retrieved on December 14, 2009, from http://www.osha.gov/OshDoc/Directive_pdf/CPL_2-1_38.pdf

OSHA Construction Regulations. (September, 2008). Retrieved December 3, 2009, from http://www.osha.gov/SLTC/powergeneration/construction.html

Spears, R. (2003). The ruler game. Retrieved on November 11, 2009, from http://www.rickyspears.com/rulergame/

Teacher Vision. (n.d.). Retrieved November 11, 2009, from http://www.teachervision.fen.com/

Tech Learning. (n.d.). Retrieved November 11, 2009, from http://techlearning.com

Vocational Information Center. (n.d.). About vocational education. In Career and technical–vocational education. Retrieved November 11, 2009, from http://www.khake.com/page50.html

Course Name: National Electric Safety Code (Safety Code)

Course Abbreviation: ULT 1523

Classification: Career Elective, AAS Core

Description: The 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. (3 sch: 2-hr lecture, 2-hr lab)

Prerequisite: None

Competencies and Suggested Objectives
1. Use the NESC as a reference manual to locate information and give a reference of where the information can be found. (DOK1)
2. Use the NESC to identify safety clearances in power line construction that includes other utilities: both overhead and underground. (DOK1)

STANDARDS

Specific standards for this course will depend upon the nature of the problem under investigation.

General Industry (29 CFR 1910)
Construction Industry (29 CFR 1926)

Related Academic Standards

R1 Interpret Graphic Information (forms, maps, reference sources)
R2 Words in Context (same and opposite meaning)
R3 Recall Information (details, sequence)
R4 Construct Meaning (main idea, summary/paraphrase, compare/contrast, cause/effect)
R5 Evaluate/Extend Meaning (fact/opinion, predict outcomes, point of view)
M1 Addition of Whole Numbers (no regrouping, regrouping)
M2 Subtraction of Whole Numbers (no regrouping, regrouping)
M3 Multiplication of Whole Numbers (no regrouping, regrouping)
M4 Division of Whole Numbers (no remainder, remainder)
M5 Decimals (addition, subtraction, multiplication, division)
M6 Fractions (addition, subtraction, multiplication, division)
M7 Integers (addition, subtraction, multiplication, division)
M8 Percents
M9 Algebraic Operations
A1 Numeration (ordering, place value, scientific notation)
A2 Number Theory (ratio, proportion)
A3 Data Interpretation (graph, table, chart, diagram)
A4 Pre-Algebra and Algebra (equations, inequality)

A5 Measurement (money, time, temperature, length, area, volume)
A6 Geometry (angles, Pythagorean theory)
A7 Computation in Context (whole numbers, decimals, fractions, algebraic operations)
A8 Estimation (rounding, estimation)
L1 Usage (pronoun, tense, subject/verb agreement, adjective, adverb)
L2 Sentence Formation (fragments, run-on, clarity)
L3 Paragraph Development (topic sentence, supporting sentence, sequence)
L4 Capitalization (proper noun, titles)
L5 Punctuation (comma, semicolon)
L6 Writing Conventions (quotation marks, apostrophe, parts of a letter)
S1 Vowel (short, long)
S2 Consonant (variant spelling, silent letter)
S3 Structural Unit (root, suffix)

21st Century Skills

CS1 Global Awareness
CS2 Financial, Economic, Business and Entrepreneurial Literacy
CS3 Civic Literacy
CS7 Critical Thinking and Problem Solving
CS8 Information and Communication Skills
CS9 Information Literacy
CS13 Initiative and Self-Direction

SUGGESTED REFERENCES

Burkart, M., McCann, M., & Paine, D. (2004). *Elevated work platforms and scaffolding*. New York, NY: McGraw-Hill Professional.

Carman, R. A., & Saunders, H. M. (2005). *Mathematics for the trades: A guided approach*. Upper Saddle River, NJ: Pearson Prentice Hall.

Clapp, A. (2006). National electrical safety code handbook: a discussion of the grounding rules, general rules, and parts 1, 2, 3, and 4 of the 3rd (1920) through 2007 editions of the National electrical safety code, American national standard C2. *Los Alamitos, CA: IEEE Press.*

Cook, N. P. (2004). *Introductory mathematics*. Upper Saddle River, NJ: Pearson Prentice Hall.

Cook, N. P. (2004). *Mathematics for technical trades*. Upper Saddle River, NJ: Pearson Prentice Hall.

Grigsby, L. (2007). *Power systems*. Boca Raton, FL: Taylor & Francis Group, LLC.

Harman, T. L. (2005). *Guide to the national electric code*. Upper Saddle River, NJ: Prentice Hall.

Hart, G. V. (2008). *Ugly's electrical references*. Houston, TX: Jones Bartlett Publishers.

Henry, T. (2008). *Dictionary for the electrician with formulas*. Winter Park, FL: Henry Publications.

Herman, S. L. (2007). *Alternating current fundamentals*. Florence, KY: Cengage Delmar Learning, Inc.

Herman, S. L. (2009). *Delmar's standard textbook of electricity*. Florence, KY: Cengage Delmar Learning, Inc.

Keljik, J. (2009). *Electricity 3: Power generation and delivery*. Florence, KY: Cengage Delmar Learning, Inc.

Keljik, J. (2009). *Electricity 4: AC/DC motors, controls, and maintenance*. Florence, KY: Cengage Delmar Learning, Inc.

Kubala, T. (2009). *Electricity 1: Devices, circuits, and materials*. Florence, KY: Cengage Delmar Learning, Inc.

Kubala, T. (2009). *Electricity 2: Devices, circuits, and materials*. Florence, KY: Cengage Delmar Learning, Inc.

MacDonald, J., Rossnagel, W., & Higgins, L. (2009). *Handbook of rigging*. New York, NY: McGraw-Hill Professional.

Marne, D. (2006, October). *National electrical safety code (NESC) handbook 2007* (2nd ed.). New York, NY: McGraw-Hill Professional.

Mazur, G. A., & Zurlis, P. A. (2003). *Electrical principles and practices*. Homewood, IL: American Technical.

Mullin, R. C., & Smith, R. L. (2005). *Electrical wiring commercial*. Clifton Park, NY: Delmar.

National Center for Construction Education and Research. (2009). *Core curriculum*. Upper Saddle River, NJ: Pearson Prentice Hall.

National Fire Protection Association. (2005). *National electric code*. Clifton Park, NY: Delmar.

Rockis, G., & Mazur, G. (2001). *Electrical motor controls*. Homewood, IL: American Technical.

Shoemaker, T., & Mack, J. (2007). *The lineman's and cableman's handbook* (11th ed.). New York, NY: McGraw-Hill Professional.

Shoemaker, T., & Mack, J. (2009). *The lineman and cablemans field manual* (2nd ed.). New York, NY: McGraw-Hill Professional.

Surbrook, T., & Althouse, J. (2005). *Interpreting the national electric code*. Clifton Park, NY: Delmar.

Titus, P. A., Titus, J. L., & Traister, J. (2002). *Illustrated dictionary for electrical workers*. Albany, NY: Delmar.

Trout, C. (2002). *Electrical installation and inspection*. Albany, NY: Delmar.

VanSoelen, W. (2006). *The guide for linemen and cablemen*. Florence, KY: Cengage Delmar Learning, Inc.

VanSoelen, W. (2007). *The field guide for powerline workers*. Florence, KY: Cengage Delmar Learning, Inc.

Journals and Magazines

Blatt, M. (2009, November–December). Optical communications for improving the performance and reliability of the smart grid. *Electric Energy T&D Magazine, 6*(13). Retrieved December 14, 2009, from http://www.electricenergyonline.com/?page=show_article&mag=60&article=461

Boyle, J. (2009). Aerial lifts. TailGate Safety Topics. Retrieved December 14, 2009, from http://www.incident-prevention.com/component/zine/article/108-aerial-lifts.html

Coveney, M. (2009, November–December). Helping utilities attain sustainability through 'Green IT'. *Electric Energy T&D Magazine, 6*(13). Retrieved December 14, 2009, from http://www.electricenergyonline.com/?page=show_article&mag=60&article=457

Shein, R. (2009, November–December). Security quality and smart grid: The utilities' dilemma. *Electric Energy T&D Magazine, 6*(13). Retrieved December 14, 2009, from http://www.electricenergyonline.com/?page=show_article&mag=60&article=460

Web Sites

Blackboard Academic Suite. (n.d.). Retrieved November 11, 2009, from http://rcu.blackboard.com/webapps/portal/frameset.jsp

Electric Energy Online (2009). *Electric Energy Magazine*, Jaguar Media Inc., Terrebonne, Quebec Canada. Retrieved December 3, 2009, from http://www.electricenergyonline.com/?page=home

E-School News. (n.d.). Retrieved November 12, 2009, from http://www.eschoolnews.com/news/top-news/index.cfm?i=50758

How stuff works. (n.d.). Retrieved November 11, 2009, from http://www.howstuffworks.com/

Kathy Schrock's guide for educators. (n.d.). In discovery education. Retrieved November 11, 2009, from http://school.discoveryeducation.com/schrockguide/

OSHA Instruction. (2003). Enforcement of the electric power generation, transmission, and distribution standard. Retrieved on December 14, 2009, from http://www.osha.gov/OshDoc/Directive_pdf/CPL_2-1_38.pdf

OSHA Construction Regulations. (September, 2008). Retrieved December 3, 2009, from http://www.osha.gov/SLTC/powergeneration/construction.html

Spears, R. (2003). The ruler game. Retrieved on November 11, 2009, from http://www.rickyspears.com/rulergame/

Teacher Vision. (n.d.). Retrieved November 11, 2009, from http://www.teachervision.fen.com/

Tech Learning. (n.d.). Retrieved November 11, 2009, from http://techlearning.com

Vocational Information Center. (n.d.). About vocational education. In Career and technical–vocational education. Retrieved November 11, 2009, from http://www.khake.com/page50.html

Course Name: Computer Fundamentals for Line Workers

Course Abbreviation: ULT 1612

Classification: Career Elective

Description: This course is designed to introduce students to basic computer skills. (2 sch: 1-hr lecture, 2-hr lab)

Prerequisite: None

Competencies and Suggested Objectives
1. Apply a basic understanding of an operating system. (DOK1) a. Show basic commands of operating system software. (DOK1) b. Illustrate the use of word processing software. (DOK1) c. Demonstrate the use of spreadsheet software. (DOK1)
2. Demonstrate use of the Internet. (DOK1) a. Browse the World Wide Web. (DOK1) b. Send electronic mail. (DOK1)

STANDARDS

Specific standards for this course will depend upon the nature of the problem under investigation.

Related Academic Standards

R1 Interpret Graphic Information (forms, maps, reference sources)
R2 Words in Context (same and opposite meaning)
R3 Recall Information (details, sequence)
R4 Construct Meaning (main idea, summary/paraphrase, compare/contrast, cause/effect)
R5 Evaluate/Extend Meaning (fact/opinion, predict outcomes, point of view)
M1 Addition of Whole Numbers (no regrouping, regrouping)
M2 Subtraction of Whole Numbers (no regrouping, regrouping)
M3 Multiplication of Whole Numbers (no regrouping, regrouping)
M4 Division of Whole Numbers (no remainder, remainder)
M5 Decimals (addition, subtraction, multiplication, division)
M6 Fractions (addition, subtraction, multiplication, division)
M7 Integers (addition, subtraction, multiplication, division)
M8 Percents
M9 Algebraic Operations
A1 Numeration (ordering, place value, scientific notation)
A2 Number Theory (ratio, proportion)
A3 Data Interpretation (graph, table, chart, diagram)
A4 Pre-Algebra and Algebra (equations, inequality)
A5 Measurement (money, time, temperature, length, area, volume)

A6 Geometry (angles, Pythagorean theory)
A7 Computation in Context (whole numbers, decimals, fractions, algebraic operations)
A8 Estimation (rounding, estimation)
L1 Usage (pronoun, tense, subject/verb agreement, adjective, adverb)
L2 Sentence Formation (fragments, run-on, clarity)
L3 Paragraph Development (topic sentence, supporting sentence, sequence)
L4 Capitalization (proper noun, titles)
L5 Punctuation (comma, semicolon)
L6 Writing Conventions (quotation marks, apostrophe, parts of a letter)
S1 Vowel (short, long)
S2 Consonant (variant spelling, silent letter)
S3 Structural Unit (root, suffix)

21st Century Skills

CS1 Global Awareness
CS2 Financial, Economic, Business and Entrepreneurial Literacy
CS3 Civic Literacy
CS7 Critical Thinking and Problem Solving
CS8 Information and Communication Skills
CS9 Information Literacy
CS13 Initiative and Self-Direction

SUGGESTED REFERENCES

Burkart, M., McCann, M., & Paine, D. (2004). *Elevated work platforms and scaffolding*. New York, NY: McGraw-Hill Professional.

Carman, R. A., & Saunders, H. M. (2005). *Mathematics for the trades: A guided approach*. Upper Saddle River, NJ: Pearson Prentice Hall.

Cook, N. P. (2004). *Introductory mathematics*. Upper Saddle River, NJ: Pearson Prentice Hall.

Cook, N. P. (2004). *Mathematics for technical trades*. Upper Saddle River, NJ: Pearson Prentice Hall.

Harman, T. L. (2005). *Guide to the national electric code*. Upper Saddle River, NJ: Prentice Hall.

Hart, G. V. (2008). *Ugly's electrical references*. Houston, TX: Jones Bartlett Publishers.

Henry, T. (n.d.). *Dictionary for the electrician with formulas*. Winter Park, FL: Henry Publications.

Herman, S. L. (2007). *Alternating current fundamentals*. Florence, KY: Cengage Delmar Learning, Inc.

Herman, S. L. (2009). *Delmar's standard textbook of electricity*. Florence, KY: Cengage Delmar Learning, Inc.

Keljik, J. (2009). *Electricity 3: Power generation and delivery*. Florence, KY: Cengage Delmar Learning, Inc.

Keljik, J. (2009). *Electricity 4: AC/DC motors, controls, and maintenance*. Florence, KY: Cengage Delmar Learning, Inc.

Kubala, T. (2009). *Electricity 1: Devices, circuits, and materials*. Florence, KY: Cengage Delmar Learning, Inc.

Kubala, T. (2009). *Electricity 2: Devices, circuits, and materials*. Florence, KY: Cengage Delmar Learning, Inc.

MacDonald, J., Rossnagel, W., & Higgins, L. (2009). Handbook of rigging. *New York, NY: McGraw-Hill Professional.*

Marne, D. (2006, October). *National electrical safety code (NESC) handbook 2007* (2nd ed.). New York, NY: McGraw-Hill Professional.

Mazur, G. A., & Zurlis, P. A. (2003). *Electrical principles and practices*. Homewood, IL: American Technical.

Mullin, R. C., & Smith, R. L. (2005). *Electrical wiring commercial*. Clifton Park, NY: Delmar.

National Center for Construction Education and Research. (2009). *Core curriculum*. Upper Saddle River, NJ: Pearson Prentice Hall.

National Fire Protection Association. (2005). *National electric code*. Clifton Park, NY: Delmar.

Rockis, G., & Mazur, G. (2001). *Electrical motor controls*. Homewood, IL: American Technical.

Shoemaker, T., & Mack, J. (2007). *The lineman's and cableman's handbook* (11th ed.). New York, NY: McGraw-Hill Professional.

Shoemaker, T., & Mack, J. (2009). *The lineman and cableman's field manual* (2nd ed.). New York, NY: McGraw-Hill Professional.

Surbrook, T., & Althouse, J. (2005). *Interpreting the national electric code*. Clifton Park, NY: Delmar.

Titus, P. A., Titus, J. L., & Traister, J. (2002). *Illustrated dictionary for electrical workers*. Albany, NY: Delmar.

Trout, C. (2002). *Electrical installation and inspection*. Albany, NY: Delmar.

VanSoelen, W. (2006). *The guide for linemen and cablemen*. Florence, KY: Cengage Delmar Learning, Inc.

VanSoelen, W. (2007). *The field guide for powerline workers*. Florence, KY: Cengage Delmar Learning, Inc.

Journals and Magazines

Blatt, M. (2009, November–December). Optical communications for improving the performance and reliability of the smart grid. *Electric Energy T&D Magazine, 6*(13). Retrieved December 14, 2009, from http://www.electricenergyonline.com/?page=show_article&mag=60&article=461

Boyle, J. (2009). Aerial lifts. TailGate Safety Topics. Retrieved December 14, 2009, from http://www.incident-prevention.com/component/zine/article/108-aerial-lifts.html

Coveney, M. (2009, November–December). Helping utilities attain sustainability through 'Green IT'. *Electric Energy T&D Magazine*, *6*(13). Retrieved December 14, 2009, from http://www.electricenergyonline.com/?page=show_article&mag=60&article=457

Shein, R. (2009, November–December). Security quality and smart grid: The utilities' dilemma. *Electric Energy T&D Magazine*, *6*(13). Retrieved December 14, 2009, from http://www.electricenergyonline.com/?page=show_article&mag=60&article=460

Web Sites

Blackboard Academic Suite. (n.d.). Retrieved November 11, 2009, from http://rcu.blackboard.com/webapps/portal/frameset.jsp

Electric Energy Online (2009). *Electric Energy Magazine*, Jaguar Media Inc., Terrebonne, Quebec Canada. Retrieved December 3, 2009, from http://www.electricenergyonline.com/?page=home

E-School News. (n.d.). Retrieved November 12, 2009, from http://www.eschoolnews.com/news/top-news/index.cfm?i=50758

How stuff works. (n.d.). Retrieved November 11, 2009, from http://www.howstuffworks.com/

Kathy Schrock's guide for educators. (n.d.). In discovery education. Retrieved November 11, 2009, from http://school.discoveryeducation.com/schrockguide/

OSHA Instruction. (2003). Enforcement of the electric power generation, transmission, and distribution standard. Retrieved on December 14, 2009, from http://www.osha.gov/OshDoc/Directive_pdf/CPL_2-1_38.pdf

OSHA Construction Regulations. (September, 2008). Retrieved December 3, 2009, from http://www.osha.gov/SLTC/powergeneration/construction.html

Spears, R. (2003). The ruler game. Retrieved on November 11, 2009, from http://www.rickyspears.com/rulergame/

Teacher Vision. (n.d.). Retrieved November 11, 2009, from http://www.teachervision.fen.com/

Tech Learning. (n.d.). Retrieved November 11, 2009, from http://techlearning.com

Vocational Information Center. (n.d.). About vocational education. In Career and technical–vocational education. Retrieved November 11, 2009, from http://www.khake.com/page50.html

Course Name: Lineworker Computer Fundamentals

Course Abbreviation: ULT 1623

Classification: AAS Elective

Description: This course is designed to introduce students to basic computer skills. (3 sch: 2-hr lecture, 2-hr lab)

Prerequisite: None

Competencies and Suggested Objectives
1. Apply a basic understanding of an operating system. (DOK1) a. Show basic commands of operating system software. (DOK1)
2. Demonstrate use of the Internet. (DOK1) a. Browse the World Wide Web. (DOK1) b. Send electronic mail. (DOK1)
3. Demonstrate the use of Blackboard. (DOK1)
4. Illustrate the use of word processing software. (DOK1)
5. Demonstrate the use of spreadsheet software. (DOK1)
6. Demonstrate the use of presentation software. (DOK1)

STANDARDS

Specific standards for this course will depend upon the nature of the problem under investigation.

Related Academic Standards

R1 Interpret Graphic Information (forms, maps, reference sources)
R2 Words in Context (same and opposite meaning)
R3 Recall Information (details, sequence)
R4 Construct Meaning (main idea, summary/paraphrase, compare/contrast, cause/effect)
R5 Evaluate/Extend Meaning (fact/opinion, predict outcomes, point of view)
M1 Addition of Whole Numbers (no regrouping, regrouping)
M2 Subtraction of Whole Numbers (no regrouping, regrouping)
M3 Multiplication of Whole Numbers (no regrouping, regrouping)
M4 Division of Whole Numbers (no remainder, remainder)
M5 Decimals (addition, subtraction, multiplication, division)
M6 Fractions (addition, subtraction, multiplication, division)
M7 Integers (addition, subtraction, multiplication, division)
M8 Percents
M9 Algebraic Operations
A1 Numeration (ordering, place value, scientific notation)
A2 Number Theory (ratio, proportion)
A3 Data Interpretation (graph, table, chart, diagram)

A4 Pre-Algebra and Algebra (equations, inequality)
A5 Measurement (money, time, temperature, length, area, volume)
A6 Geometry (angles, Pythagorean theory)
A7 Computation in Context (whole numbers, decimals, fractions, algebraic operations)
A8 Estimation (rounding, estimation)
L1 Usage (pronoun, tense, subject/verb agreement, adjective, adverb)
L2 Sentence Formation (fragments, run-on, clarity)
L3 Paragraph Development (topic sentence, supporting sentence, sequence)
L4 Capitalization (proper noun, titles)
L5 Punctuation (comma, semicolon)
L6 Writing Conventions (quotation marks, apostrophe, parts of a letter)
S1 Vowel (short, long)
S2 Consonant (variant spelling, silent letter)
S3 Structural Unit (root, suffix)

21st Century Skills

CS1 Global Awareness
CS2 Financial, Economic, Business and Entrepreneurial Literacy
CS3 Civic Literacy
CS7 Critical Thinking and Problem Solving
CS8 Information and Communication Skills
CS9 Information Literacy
CS13 Initiative and Self-Direction

SUGGESTED REFERENCES

Burkart, M., McCann, M., & Paine, D. (2004). *Elevated work platforms and scaffolding*. New York, NY: McGraw-Hill Professional.

Carman, R. A., & Saunders, H. M. (2005). *Mathematics for the trades: A guided approach*. Upper Saddle River, NJ: Pearson Prentice Hall.

Cook, N. P. (2004). *Introductory mathematics*. Upper Saddle River, NJ: Pearson Prentice Hall.

Cook, N. P. (2004). *Mathematics for technical trades*. Upper Saddle River, NJ: Pearson Prentice Hall.

Harman, T. L. (2005). *Guide to the national electric code*. Upper Saddle River, NJ: Prentice Hall.

Hart, G. V. (2008). *Ugly's electrical references*. Houston, TX: Jones Bartlett Publishers.

Henry, T. (n.d.). *Dictionary for the electrician with formulas*. Winter Park, FL: Henry Publications.

Herman, S. L. (2007). *Alternating current fundamentals*. Florence, KY: Cengage Delmar Learning, Inc.

Herman, S. L. (2009). *Delmar's standard textbook of electricity*. Florence, KY: Cengage Delmar Learning, Inc.

Keljik, J. (2009). *Electricity 3: Power generation and delivery*. Florence, KY: Cengage Delmar Learning, Inc.

Keljik, J. (2009). *Electricity 4: AC/DC motors, controls, and maintenance*. Florence, KY: Cengage Delmar Learning, Inc.

Kubala, T. (2009). *Electricity 1: Devices, circuits, and materials*. Florence, KY: Cengage Delmar Learning, Inc.

Kubala, T. (2009). *Electricity 2: Devices, circuits, and materials*. Florence, KY: Cengage Delmar Learning, Inc.

MacDonald, J., Rossnagel, W., & Higgins, L. (2009). *Handbook of rigging*. New York, NY: McGraw-Hill Professional.

Marne, D. (2006, October). *National electrical safety code (NESC) handbook 2007* (2nd ed.). New York, NY: McGraw-Hill Professional.

Mazur, G. A., & Zurlis, P. A. (2003). *Electrical principles and practices*. Homewood, IL: American Technical.

Mullin, R. C., & Smith, R. L. (2005). *Electrical wiring commercial*. Clifton Park, NY: Delmar.

National Center for Construction Education and Research. (2009). *Core curriculum*. Upper Saddle River, NJ: Pearson Prentice Hall.

National Fire Protection Association. (2005). *National electric code*. Clifton Park, NY: Delmar.

Rockis, G., & Mazur, G. (2001). *Electrical motor controls*. Homewood, IL: American Technical.

Shoemaker, T., & Mack, J. (2007). *The lineman's and cableman's handbook* (11th ed.). New York, NY: McGraw-Hill Professional.

Shoemaker, T., & Mack, J. (2009). *The lineman and cablemans field manual* (2nd ed.). New York, NY: McGraw-Hill Professional.

Surbrook, T., & Althouse, J. (2005). *Interpreting the national electric code*. Clifton Park, NY: Delmar.

Titus, P. A., Titus, J. L., & Traister, J. (2002). *Illustrated dictionary for electrical workers*. Albany, NY: Delmar.

Trout, C. (2002). *Electrical installation and inspection*. Albany, NY: Delmar.

VanSoelen, W. (2006). *The guide for linemen and cablemen*. Florence, KY: Cengage Delmar Learning, Inc.

VanSoelen, W. (2007). *The field guide for powerline workers*. Florence, KY: Cengage Delmar Learning, Inc.

Journals and Magazines

Blatt, M. (2009, November–December). Optical communications for improving the performance and reliability of the smart grid. *Electric Energy T&D Magazine, 6*(13). Retrieved December 14, 2009, from http://www.electricenergyonline.com/?page=show_article&mag=60&article=461

Boyle, J. (2009). Aerial lifts. TailGate Safety Topics. Retrieved December 14, 2009, from http://www.incident-prevention.com/component/zine/article/108-aerial-lifts.html

Coveney, M. (2009, November–December). Helping utilities attain sustainability through 'Green IT'. *Electric Energy T&D Magazine, 6*(13). Retrieved December 14, 2009, from http://www.electricenergyonline.com/?page=show_article&mag=60&article=457

Shein, R. (2009, November–December). Security quality and smart grid: The utilities' dilemma. *Electric Energy T&D Magazine, 6*(13). Retrieved December 14, 2009, from http://www.electricenergyonline.com/?page=show_article&mag=60&article=460

Web Sites

Blackboard Academic Suite. (n.d.). Retrieved November 11, 2009, from http://rcu.blackboard.com/webapps/portal/frameset.jsp

Electric Energy Online (2009). *Electric Energy Magazine*, Jaguar Media Inc., Terrebonne, Quebec Canada. Retrieved December 3, 2009, from http://www.electricenergyonline.com/?page=home

E-School News. (n.d.). Retrieved November 12, 2009, from http://www.eschoolnews.com/news/top-news/index.cfm?i=50758

How stuff works. (n.d.). Retrieved November 11, 2009, from http://www.howstuffworks.com/

Kathy Schrock's guide for educators. (n.d.). In discovery education. Retrieved November 11, 2009, from http://school.discoveryeducation.com/schrockguide/

OSHA Instruction. (2003). Enforcement of the electric power generation, transmission, and distribution standard. Retrieved on December 14, 2009, from http://www.osha.gov/OshDoc/Directive_pdf/CPL_2-1_38.pdf

OSHA Construction Regulations. (September, 2008). Retrieved December 3, 2009, from http://www.osha.gov/SLTC/powergeneration/construction.html

Spears, R. (2003). The ruler game. Retrieved on November 11, 2009, from http://www.rickyspears.com/rulergame/

Teacher Vision. (n.d.). Retrieved November 11, 2009, from http://www.teachervision.fen.com/

Tech Learning. (n.d.). Retrieved November 11, 2009, from http://techlearning.com

Vocational Information Center. (n.d.). About vocational education. In Career and technical–vocational education. Retrieved November 11, 2009, from http://www.khake.com/page50.html

Course Name: Overhead Construction

Course Abbreviation: ULT 2133

Classification: AAS Core

Description: This course is designed to provide further fundamental training in the field of electric line work dealing with the overhead line construction. (3 sch: 1-hr lecture, 4-hr lab)

Pre/Co Requisite		
Pole Climbing (ULT 1413)	**OR**	By consent of instructor

Competencies and Suggested Objectives
1. Apply industry standard specifications for pole framing. (DOK1, OVL)
2. Discuss material and tool nomenclature. (DOK1, OVL)
3. Demonstrate framing and working on poles up to full height. (DOK2, USF, GRD, OVL)
4. Demonstrate transformer change out from pole. (DOK2, MHE, URG, USF, GRD, OVL) a. Demonstrate rigging for transformer change out. (DOK2) b. Demonstrate proper equipment lifting. (DOK2) c. Demonstrate proper rope and knot tying techniques. (DOK2)
5. Demonstrate proper protective pole grounding procedures for power systems. (DOK2, GRD, OVL)

STANDARDS

MHE Material handling equipment 1926.602
URG Rigging equipment for material handling 1926.251
USF General safety and health provisions 1926.20
GRD Grounding for protection of employees 1926.954
OVL Overhead lines 1926.955

Related Academic Standards

R1 Interpret Graphic Information (forms, maps, reference sources)
R2 Words in Context (same and opposite meaning)
R3 Recall Information (details, sequence)
R4 Construct Meaning (main idea, summary/paraphrase, compare/contrast, cause/effect)
R5 Evaluate/Extend Meaning (fact/opinion, predict outcomes, point of view)
M1 Addition of Whole Numbers (no regrouping, regrouping)
M2 Subtraction of Whole Numbers (no regrouping, regrouping)
M3 Multiplication of Whole Numbers (no regrouping, regrouping)
M4 Division of Whole Numbers (no remainder, remainder)
M5 Decimals (addition, subtraction, multiplication, division)
M6 Fractions (addition, subtraction, multiplication, division)
M7 Integers (addition, subtraction, multiplication, division)

M8 Percents
M9 Algebraic Operations
A1 Numeration (ordering, place value, scientific notation)
A2 Number Theory (ratio, proportion)
A3 Data Interpretation (graph, table, chart, diagram)
A4 Pre-Algebra and Algebra (equations, inequality)
A5 Measurement (money, time, temperature, length, area, volume)
A6 Geometry (angles, Pythagorean theory)
A7 Computation in Context (whole numbers, decimals, fractions, algebraic operations)
A8 Estimation (rounding, estimation)
L1 Usage (pronoun, tense, subject/verb agreement, adjective, adverb)
L2 Sentence Formation (fragments, run-on, clarity)
L3 Paragraph Development (topic sentence, supporting sentence, sequence)
L4 Capitalization (proper noun, titles)
L5 Punctuation (comma, semicolon)
L6 Writing Conventions (quotation marks, apostrophe, parts of a letter)
S1 Vowel (short, long)
S2 Consonant (variant spelling, silent letter)
S3 Structural Unit (root, suffix)

21st Century Skills

CS1 Global Awareness
CS2 Financial, Economic, Business and Entrepreneurial Literacy
CS3 Civic Literacy
CS7 Critical Thinking and Problem Solving
CS8 Information and Communication Skills
CS9 Information Literacy
CS13 Initiative and Self-Direction

SUGGESTED REFERENCES

Burkart, M., McCann, M., & Paine, D. (2004). *Elevated work platforms and scaffolding*. New York, NY: McGraw-Hill Professional.

Carman, R. A., & Saunders, H. M. (2005). *Mathematics for the trades: A guided approach*. Upper Saddle River, NJ: Pearson Prentice Hall.

Cook, N. P. (2004). *Introductory mathematics*. Upper Saddle River, NJ: Pearson Prentice Hall.

Cook, N. P. (2004). *Mathematics for technical trades*. Upper Saddle River, NJ: Pearson Prentice Hall.

Harman, T. L. (2005). *Guide to the national electric code*. Upper Saddle River, NJ: Prentice Hall.

Hart, G. V. (2008). *Ugly's electrical references*. Houston, TX: Jones Bartlett Publishers.

Henry, T. (n.d.). *Dictionary for the electrician with formulas*. Winter Park, FL: Henry Publications.

Herman, S. L. (2007). *Alternating current fundamentals*. Florence, KY: Cengage Delmar Learning, Inc.

Herman, S. L. (2009). *Delmar's standard textbook of electricity*. Florence, KY: Cengage Delmar Learning, Inc.

Keljik, J. (2009). *Electricity 3: Power generation and delivery*. Florence, KY: Cengage Delmar Learning, Inc.

Keljik, J. (2009). *Electricity 4: AC/DC motors, controls, and maintenance*. Florence, KY: Cengage Delmar Learning, Inc.

Kubala, T. (2009). *Electricity 1: Devices, circuits, and materials*. Florence, KY: Cengage Delmar Learning, Inc.

Kubala, T. (2009). *Electricity 2: Devices, circuits, and materials*. Florence, KY: Cengage Delmar Learning, Inc.

MacDonald, J., Rossnagel, W., & Higgins, L. (2009). *Handbook of rigging*. New York, NY: McGraw-Hill Professional.

Marne, D. (2006, October). *National electrical safety code (NESC) handbook 2007* (2nd ed.). New York, NY: McGraw-Hill Professional.

Mazur, G. A., & Zurlis, P. A. (2003). *Electrical principles and practices*. Homewood, IL: American Technical.

Mullin, R. C., & Smith, R. L. (2005). *Electrical wiring commercial*. Clifton Park, NY: Delmar.

National Center for Construction Education and Research. (2009). *Core curriculum*. Upper Saddle River, NJ: Pearson Prentice Hall.

National Fire Protection Association. (2005). *National electric code*. Clifton Park, NY: Delmar.

Rockis, G., & Mazur, G. (2001). *Electrical motor controls*. Homewood, IL: American Technical.

Shoemaker, T. & Mack, J. (2007). *The lineman's and cableman's handbook* (11th ed.). New York, NY: McGraw-Hill Professional.

Shoemaker, T. & Mack, J. (2009). *The lineman and cablemans field manual* (2nd ed.). New York, NY: McGraw-Hill Professional.

Surbrook, T., & Althouse, J. (2005). *Interpreting the national electric code*. Clifton Park, NY: Delmar.

Titus, P. A., Titus, J. L., & Traister, J. (2002). *Illustrated dictionary for electrical workers*. Albany, NY: Delmar.

Trout, C. (2002). *Electrical installation and inspection*. Albany, NY: Delmar.

VanSoelen, W. (2006). *The guide for linemen and cablemen*. Florence, KY: Cengage Delmar Learning, Inc.

VanSoelen, W. (2007). *The field guide for powerline workers*. Florence, KY: Cengage Delmar Learning, Inc.

Journals and Magazines

Blatt, M. (2009, November–December). Optical communications for improving the performance and reliability of the smart grid. *Electric Energy T&D Magazine, 6*(13). Retrieved December 14, 2009, from http://www.electricenergyonline.com/?page=show_article&mag=60&article=461

Boyle, J. (2009). Aerial lifts. TailGate Safety Topics. Retrieved December 14, 2009, from http://www.incident-prevention.com/component/zine/article/108-aerial-lifts.html

Coveney, M. (2009, November–December). Helping utilities attain sustainability through 'Green IT'. *Electric Energy T&D Magazine, 6*(13). Retrieved December 14, 2009, from http://www.electricenergyonline.com/?page=show_article&mag=60&article=457

Shein, R. (2009, November–December). Security quality and smart grid: The utilities' dilemma. *Electric Energy T&D Magazine, 6*(13). Retrieved December 14, 2009, from http://www.electricenergyonline.com/?page=show_article&mag=60&article=460

Web Sites

Blackboard Academic Suite. (n.d.). Retrieved November 11, 2009, from http://rcu.blackboard.com/webapps/portal/frameset.jsp

Electric Energy Online (2009). *Electric Energy Magazine*, Jaguar Media Inc., Terrebonne, Quebec Canada. Retrieved December 3, 2009, from http://www.electricenergyonline.com/?page=home

E-School News. (n.d.). Retrieved November 12, 2009, from http://www.eschoolnews.com/news/top-news/index.cfm?i=50758

How stuff works. (n.d.). Retrieved November 11, 2009, from http://www.howstuffworks.com/

Kathy Schrock's guide for educators. (n.d.). In discovery education. Retrieved November 11, 2009, from http://school.discoveryeducation.com/schrockguide/

OSHA Instruction. (2003). Enforcement of the electric power generation, transmission, and distribution standard. Retrieved on December 14, 2009, from http://www.osha.gov/OshDoc/Directive_pdf/CPL_2-1_38.pdf

OSHA Construction Regulations. (September, 2008). Retrieved December 3, 2009, from http://www.osha.gov/SLTC/powergeneration/construction.html

Spears, R. (2003). The ruler game. Retrieved on November 11, 2009, from http://www.rickyspears.com/rulergame/

Teacher Vision. (n.d.). Retrieved November 11, 2009, from http://www.teachervision.fen.com/

Tech Learning. (n.d.). Retrieved November 11, 2009, from http://techlearning.com

Vocational Information Center. (n.d.). About vocational education. In Career and technical–vocational education. Retrieved November 11, 2009, from http://www.khake.com/page50.html

Course Name: Underground Construction

Course Abbreviation: ULT 2143

Classification: AAS Core

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. (3 sch: 1-hr lecture, 4-hr lab)

Pre/Co Requisite		
Pole Climbing (ULT 1413)	**OR**	By consent of instructor

Competencies and Suggested Objectives
1. Apply industry standard specifications for underground construction. (DOK1, USF, GRD, UGL)
2. Discuss material and tool nomenclature. (DOK1, USF, GRD, UGL)
3. Demonstrate transformer change out. (DOK2, MHE, URG, USF, GRD) a. Demonstrate rigging for transformer change out. (DOK2) b. Demonstrate proper equipment lifting. (DOK2) c. Demonstrate proper rope and knot tying techniques. (DOK2)
4. Demonstrate proper protective grounding procedures for power systems. (DOK1, USF, GRD, UGL)
5. Demonstrate proper protective grounding procedures for single phase and three phase transformers. (DOK1, USF, GRD, UGL)
6. Demonstrate the makeup of outdoor termination, elbows and splices. (DOK1, USF, GRD, UGL)
7. Demonstrate the repairs of various secondary faults. (DOK1, USF, GRD, UGL)
8. Demonstrate the fault finding techniques. (DOK1, USF, GRD, UGL)

STANDARDS

MHE Material handling equipment 1926.602
URG Rigging equipment for material handling 1926.251
USF General safety and health provisions 1926.20
GRD Grounding for protection of employees 1926.954
UGL Underground lines 1926.956

Related Academic Standards

R1 Interpret Graphic Information (forms, maps, reference sources)
R2 Words in Context (same and opposite meaning)
R3 Recall Information (details, sequence)
R4 Construct Meaning (main idea, summary/paraphrase, compare/contrast, cause/effect)
R5 Evaluate/Extend Meaning (fact/opinion, predict outcomes, point of view)
M1 Addition of Whole Numbers (no regrouping, regrouping)
M2 Subtraction of Whole Numbers (no regrouping, regrouping)
M3 Multiplication of Whole Numbers (no regrouping, regrouping)

M4 Division of Whole Numbers (no remainder, remainder)
M5 Decimals (addition, subtraction, multiplication, division)
M6 Fractions (addition, subtraction, multiplication, division)
M7 Integers (addition, subtraction, multiplication, division)
M8 Percents
M9 Algebraic Operations
A1 Numeration (ordering, place value, scientific notation)
A2 Number Theory (ratio, proportion)
A3 Data Interpretation (graph, table, chart, diagram)
A4 Pre-Algebra and Algebra (equations, inequality)
A5 Measurement (money, time, temperature, length, area, volume)
A6 Geometry (angles, Pythagorean theory)
A7 Computation in Context (whole numbers, decimals, fractions, algebraic operations)
A8 Estimation (rounding, estimation)
L1 Usage (pronoun, tense, subject/verb agreement, adjective, adverb)
L2 Sentence Formation (fragments, run-on, clarity)
L3 Paragraph Development (topic sentence, supporting sentence, sequence)
L4 Capitalization (proper noun, titles)
L5 Punctuation (comma, semicolon)
L6 Writing Conventions (quotation marks, apostrophe, parts of a letter)
S1 Vowel (short, long)
S2 Consonant (variant spelling, silent letter)
S3 Structural Unit (root, suffix)

21st Century Skills

CS1 Global Awareness
CS2 Financial, Economic, Business and Entrepreneurial Literacy
CS3 Civic Literacy
CS7 Critical Thinking and Problem Solving
CS8 Information and Communication Skills
CS9 Information Literacy
CS13 Initiative and Self-Direction

SUGGESTED REFERENCES

Burkart, M., McCann, M., & Paine, D. (2004). *Elevated work platforms and scaffolding*. New York, NY: McGraw-Hill Professional.

Carman, R. A., & Saunders, H. M. (2005). *Mathematics for the trades: A guided approach*. Upper Saddle River, NJ: Pearson Prentice Hall.

Cook, N. P. (2004). *Introductory mathematics*. Upper Saddle River, NJ: Pearson Prentice Hall.

Cook, N. P. (2004). *Mathematics for technical trades*. Upper Saddle River, NJ: Pearson Prentice Hall.

Harman, T. L. (2005). *Guide to the national electric code*. Upper Saddle River, NJ: Prentice Hall.

Hart, G. V. (2008). *Ugly's electrical references*. Houston, TX: Jones $ Bartlett Publishers.

Henry, T. (n.d.). *Dictionary for the electrician with formulas.* Winter Park, FL: Henry Publications.

Herman, S. L. (2007). *Alternating current fundamentals*. Florence, KY: Cengage Delmar Learning, Inc.

Herman, S. L. (2009). *Delmar's standard textbook of electricity*. Florence, KY: Cengage Delmar Learning, Inc.

Keljik, J. (2009). *Electricity 3: Power generation and delivery*. Florence, KY: Cengage Delmar Learning, Inc.

Keljik, J. (2009). *Electricity 4: AC/DC motors, controls, and maintenance*. Florence, KY: Cengage Delmar Learning, Inc.

Kubala, T. (2009). *Electricity 1: Devices, circuits, and materials*. Florence, KY: Cengage Delmar Learning, Inc.

Kubala, T. (2009). *Electricity 2: Devices, circuits, and materials*. Florence, KY: Cengage Delmar Learning, Inc.

MacDonald, J., Rossnagel, W., & Higgins, L. (2009). *Handbook of rigging*. New York, NY: McGraw-Hill Professional.

Marne, D. (2006, October). *National electrical safety code (NESC) handbook 2007* (2nd ed.). New York, NY: McGraw-Hill Professional.

Mazur, G. A., & Zurlis, P. A. (2003). *Electrical principles and practices*. Homewood, IL: American Technical.

Mullin, R. C., & Smith, R. L. (2005). *Electrical wiring commercial*. Clifton Park, NY: Delmar.

National Center for Construction Education and Research. (2009). *Core curriculum*. Upper Saddle River, NJ: Pearson Prentice Hall.

National Fire Protection Association. (2005). *National electric code*. Clifton Park, NY: Delmar.

Rockis, G., & Mazur, G. (2001). *Electrical motor controls*. Homewood, IL: American Technical.

Shoemaker, T., & Mack, J. (2007). *The lineman's and cableman's handbook* (11th ed.). New York, NY: McGraw-Hill Professional.

Shoemaker, T., & Mack, J. (2009). *The lineman and cableman's field manual* (2nd ed.). New York, NY: McGraw-Hill Professional.

Surbrook, T., & Althouse, J. (2005). *Interpreting the national electric code*. Clifton Park, NY: Delmar.

Titus, P. A., Titus, J. L., & Traister, J. (2002). *Illustrated dictionary for electrical workers*. Albany, NY: Delmar.

Trout, C. (2002). *Electrical installation and inspection*. Albany, NY: Delmar.

VanSoelen, W. (2006). *The guide for linemen and cablemen*. Florence, KY: Cengage Delmar Learning, Inc.

VanSoelen, W. (2007). *The field guide for powerline workers*. Florence, KY: Cengage Delmar Learning, Inc.

Journals and Magazines

Blatt, M. (2009, November–December). Optical communications for improving the performance and reliability of the smart grid. *Electric Energy T&D Magazine, 6*(13). Retrieved December 14, 2009, from http://www.electricenergyonline.com/?page=show_article&mag=60&article=461

Boyle, J. (2009). Aerial lifts. TailGate Safety Topics. Retrieved December 14, 2009, from http://www.incident-prevention.com/component/zine/article/108-aerial-lifts.html

Coveney, M. (2009, November–December). Helping utilities attain sustainability through 'Green IT'. *Electric Energy T&D Magazine, 6*(13). Retrieved December 14, 2009, from http://www.electricenergyonline.com/?page=show_article&mag=60&article=457

Shein, R. (2009, November–December). Security quality and smart grid: The utilities' dilemma. *Electric Energy T&D Magazine, 6*(13). Retrieved December 14, 2009, from http://www.electricenergyonline.com/?page=show_article&mag=60&article=460

Web Sites

Blackboard Academic Suite. (n.d.). Retrieved November 11, 2009, from http://rcu.blackboard.com/webapps/portal/frameset.jsp

Electric Energy Online (2009). *Electric Energy Magazine*, Jaguar Media Inc., Terrebonne, Quebec Canada. Retrieved December 3, 2009, from http://www.electricenergyonline.com/?page=home

E-School News. (n.d.). Retrieved November 12, 2009, from http://www.eschoolnews.com/news/top-news/index.cfm?i=50758

How stuff works. (n.d.). Retrieved November 11, 2009, from http://www.howstuffworks.com/

Kathy Schrock's guide for educators. (n.d.). In discovery education. Retrieved November 11, 2009, from http://school.discoveryeducation.com/schrockguide/

OSHA Instruction. (2003). Enforcement of the electric power generation, transmission, and distribution standard. Retrieved on December 14, 2009, from http://www.osha.gov/OshDoc/Directive_pdf/CPL_2-1_38.pdf

OSHA Construction Regulations. (September, 2008). Retrieved December 3, 2009, from http://www.osha.gov/SLTC/powergeneration/construction.html

Spears, R. (2003). The ruler game. Retrieved on November 11, 2009, from http://www.rickyspears.com/rulergame/

Teacher Vision. (n.d.). Retrieved November 11, 2009, from http://www.teachervision.fen.com/

Tech Learning. (n.d.). Retrieved November 11, 2009, from http://techlearning.com

Vocational Information Center. (n.d.). About vocational education. In Career and technical–vocational education. Retrieved November 11, 2009, from http://www.khake.com/page50.html

Course Name: System Design and Operation

Course Abbreviation: ULT 2233

Classification: Career Elective, AAS Core

Description: This course includes operation basics for protection of the electrical system overhead, underground, and substation. (3 sch: 1-hr lecture, 4-hr lab)

Pre/Co Requisite		
Pole Climbing (ULT 1413) **AND** Overhead Construction (ULT 2133) **AND** Underground Construction (ULT 2143)	**OR**	By consent of instructor

Competencies and Suggested Objectives
1. Discuss types and uses of fuses. (DOK1)
2. Discuss the types and uses of oil circuit reclosers. (DOK1)
3. Discuss the types and uses of regulators. (DOK1)
4. Discuss the types and uses of capacitor banks. (DOK1)
5. Discuss the types and uses of sectionalizers. (DOK1)
6. Discuss the protective equipment use on lateral and dip/riser poles. (DOK1)

STANDARDS

Specific standards for this course will depend upon the nature of the problem under investigation.

Related Academic Standards

R1 Interpret Graphic Information (forms, maps, reference sources)
R2 Words in Context (same and opposite meaning)
R3 Recall Information (details, sequence)
R4 Construct Meaning (main idea, summary/paraphrase, compare/contrast, cause/effect)
R5 Evaluate/Extend Meaning (fact/opinion, predict outcomes, point of view)
M1 Addition of Whole Numbers (no regrouping, regrouping)
M2 Subtraction of Whole Numbers (no regrouping, regrouping)
M3 Multiplication of Whole Numbers (no regrouping, regrouping)
M4 Division of Whole Numbers (no remainder, remainder)
M5 Decimals (addition, subtraction, multiplication, division)
M6 Fractions (addition, subtraction, multiplication, division)
M7 Integers (addition, subtraction, multiplication, division)
M8 Percents
M9 Algebraic Operations
A1 Numeration (ordering, place value, scientific notation)

A2 Number Theory (ratio, proportion)
A3 Data Interpretation (graph, table, chart, diagram)
A4 Pre-Algebra and Algebra (equations, inequality)
A5 Measurement (money, time, temperature, length, area, volume)
A6 Geometry (angles, Pythagorean theory)
A7 Computation in Context (whole numbers, decimals, fractions, algebraic operations)
A8 Estimation (rounding, estimation)
L1 Usage (pronoun, tense, subject/verb agreement, adjective, adverb)
L2 Sentence Formation (fragments, run-on, clarity)
L3 Paragraph Development (topic sentence, supporting sentence, sequence)
L4 Capitalization (proper noun, titles)
L5 Punctuation (comma, semicolon)
L6 Writing Conventions (quotation marks, apostrophe, parts of a letter)
S1 Vowel (short, long)
S2 Consonant (variant spelling, silent letter)
S3 Structural Unit (root, suffix)

21st Century Skills

CS1 Global Awareness
CS2 Financial, Economic, Business and Entrepreneurial Literacy
CS3 Civic Literacy
CS7 Critical Thinking and Problem Solving
CS8 Information and Communication Skills
CS9 Information Literacy
CS13 Initiative and Self-Direction

SUGGESTED REFERENCES

Burkart, M., McCann, M., & Paine, D. (2004). *Elevated work platforms and scaffolding*. New York, NY: McGraw-Hill Professional.

Carman, R. A., & Saunders, H. M. (2005). *Mathematics for the trades: A guided approach*. Upper Saddle River, NJ: Pearson Prentice Hall.

Cook, N. P. (2004). *Introductory mathematics*. Upper Saddle River, NJ: Pearson Prentice Hall.

Cook, N. P. (2004). *Mathematics for technical trades*. Upper Saddle River, NJ: Pearson Prentice Hall.

Harman, T. L. (2005). *Guide to the national electric code*. Upper Saddle River, NJ: Prentice Hall.

Hart, G. V. (2008). *Ugly's electrical references*. Houston, TX: Jones Bartlett Publishers.

Henry, T. (n.d.). *Dictionary for the electrician with formulas*. Winter Park, FL: Henry Publications.

Herman, S. L. (2007). *Alternating current fundamentals*. Florence, KY: Cengage Delmar Learning, Inc.

Herman, S. L. (2009). *Delmar's standard textbook of electricity*. Florence, KY: Cengage Delmar Learning, Inc.

Keljik, J. (2009). *Electricity 3: Power generation and delivery*. Florence, KY: Cengage Delmar Learning, Inc.

Keljik, J. (2009). *Electricity 4: AC/DC motors, controls, and maintenance*. Florence, KY: Cengage Delmar Learning, Inc.

Kubala, T. (2009). *Electricity 1: Devices, circuits, and materials*. Florence, KY: Cengage Delmar Learning, Inc.

Kubala, T. (2009). *Electricity 2: Devices, circuits, and materials*. Florence, KY: Cengage Delmar Learning, Inc.

MacDonald, J., Rossnagel, W., & Higgins, L. (2009). *Handbook of rigging*. New York, NY: McGraw-Hill Professional.

Marne, D. (2006, October). *National electrical safety code (NESC) handbook 2007* (2nd ed.). New York, NY: McGraw-Hill Professional.

Mazur, G. A., & Zurlis, P. A. (2003). *Electrical principles and practices*. Homewood, IL: American Technical.

Mullin, R. C., & Smith, R. L. (2005). *Electrical wiring commercial*. Clifton Park, NY: Delmar.

National Center for Construction Education and Research. (2009). *Core curriculum*. Upper Saddle River, NJ: Pearson Prentice Hall.

National Fire Protection Association. (2005). *National electric code*. Clifton Park, NY: Delmar.

Rockis, G., & Mazur, G. (2001). *Electrical motor controls*. Homewood, IL: American Technical.

Shoemaker, T., & Mack, J. (2007). *The lineman's and cableman's handbook* (11th ed.). New York, NY: McGraw-Hill Professional.

Shoemaker, T., & Mack, J. (2009). *The lineman and cableman's field manual* (2nd ed.). New York, NY: McGraw-Hill Professional.

Surbrook, T., & Althouse, J. (2005). *Interpreting the national electric code*. Clifton Park, NY: Delmar.

Titus, P. A., Titus, J. L., & Traister, J. (2002). *Illustrated dictionary for electrical workers*. Albany, NY: Delmar.

Trout, C. (2002). *Electrical installation and inspection*. Albany, NY: Delmar.

VanSoelen, W. (2006). *The guide for linemen and cablemen*. Florence, KY: Cengage Delmar Learning, Inc.

VanSoelen, W. (2007). *The field guide for powerline workers*. Florence, KY: Cengage Delmar Learning, Inc.

Journals and Magazines

Blatt, M. (2009, November–December). Optical communications for improving the performance and reliability of the smart grid. *Electric Energy T&D Magazine*, *6*(13). Retrieved December 14, 2009, from http://www.electricenergyonline.com/?page=show_article&mag=60&article=461

Boyle, J. (2009). Aerial lifts. TailGate Safety Topics. Retrieved December 14, 2009, from http://www.incident-prevention.com/component/zine/article/108-aerial-lifts.html

Coveney, M. (2009, November–December). Helping utilities attain sustainability through 'Green IT'. *Electric Energy T&D Magazine*, *6*(13). Retrieved December 14, 2009, from http://www.electricenergyonline.com/?page=show_article&mag=60&article=457

Shein, R. (2009, November–December). Security quality and smart grid: The utilities' dilemma. *Electric Energy T&D Magazine*, *6*(13). Retrieved December 14, 2009, from http://www.electricenergyonline.com/?page=show_article&mag=60&article=460

Web Sites

Blackboard Academic Suite. (n.d.). Retrieved November 11, 2009, from http://rcu.blackboard.com/webapps/portal/frameset.jsp

Electric Energy Online (2009). Electric Energy Magazine, Jaguar Media Inc., Terrebonne, Quebec Canada. Retrieved December 3, 2009, from http://www.electricenergyonline.com/?page=home

E-School News. (n.d.). Retrieved November 12, 2009, from http://www.eschoolnews.com/news/top-news/index.cfm?i=50758

How stuff works. (n.d.). Retrieved November 11, 2009, from http://www.howstuffworks.com/

Kathy Schrock's guide for educators. (n.d.). In discovery education. Retrieved November 11, 2009, from http://school.discoveryeducation.com/schrockguide/

OSHA Instruction. (2003). Enforcement of the electric power generation, transmission, and distribution standard. Retrieved on December 14, 2009, from http://www.osha.gov/OshDoc/Directive_pdf/CPL_2-1_38.pdf

OSHA Construction Regulations. (September, 2008). Retrieved December 3, 2009, from http://www.osha.gov/SLTC/powergeneration/construction.html

Spears, R. (2003). The ruler game. Retrieved on November 11, 2009, from http://www.rickyspears.com/rulergame/

Teacher Vision. (n.d.). Retrieved November 11, 2009, from http://www.teachervision.fen.com/

Tech Learning. (n.d.). Retrieved November 11, 2009, from http://techlearning.com

Vocational Information Center. (n.d.). About vocational education. In Career and technical–vocational education. Retrieved November 11, 2009, from http://www.khake.com/page50.html

Course Name: Working in Elevated Work Sites

Course Abbreviation: ULT 2244

Classification: Career Elective, AAS Core

Description: This course is designed to provide a line worker with fundamental skills needed to perform basic pole climbing. (4 sch: 1-hr lecture, 6-hr lab)

Pre/Co Requisite		
Pole Climbing (ULT 1413) **AND** Overhead Construction (ULT 2133) **AND** Underground Construction (ULT 2143)	**OR**	By consent of instructor

Competencies and Suggested Objectives
1. Discuss and demonstrate use and inspection of pole climbing equipment. (DOK1)
2. Demonstrate pole climbing skills as prescribed by industry on full length poles. (DOK2)
3. Discuss and demonstrate proper structural inspection procedures of full length poles, cross members, and supports. (DOK2)
4. Demonstrate the proper method of sharpening gaffs. (DOK1)
5. Demonstrate proper climbing techniques on full length poles. (DOK1)
6. Demonstrate bucket truck rescue procedures. (DOK2)

STANDARDS

Specific standards for this course will depend upon the nature of the problem under investigation.

Related Academic Standards

R1 Interpret Graphic Information (forms, maps, reference sources)
R2 Words in Context (same and opposite meaning)
R3 Recall Information (details, sequence)
R4 Construct Meaning (main idea, summary/paraphrase, compare/contrast, cause/effect)
R5 Evaluate/Extend Meaning (fact/opinion, predict outcomes, point of view)
M1 Addition of Whole Numbers (no regrouping, regrouping)
M2 Subtraction of Whole Numbers (no regrouping, regrouping)
M3 Multiplication of Whole Numbers (no regrouping, regrouping)
M4 Division of Whole Numbers (no remainder, remainder)
M5 Decimals (addition, subtraction, multiplication, division)
M6 Fractions (addition, subtraction, multiplication, division)
M7 Integers (addition, subtraction, multiplication, division)
M8 Percents
M9 Algebraic Operations

A1 Numeration (ordering, place value, scientific notation)
A2 Number Theory (ratio, proportion)
A3 Data Interpretation (graph, table, chart, diagram)
A4 Pre-Algebra and Algebra (equations, inequality)
A5 Measurement (money, time, temperature, length, area, volume)
A6 Geometry (angles, Pythagorean theory)
A7 Computation in Context (whole numbers, decimals, fractions, algebraic operations)
A8 Estimation (rounding, estimation)
L1 Usage (pronoun, tense, subject/verb agreement, adjective, adverb)
L2 Sentence Formation (fragments, run-on, clarity)
L3 Paragraph Development (topic sentence, supporting sentence, sequence)
L4 Capitalization (proper noun, titles)
L5 Punctuation (comma, semicolon)
L6 Writing Conventions (quotation marks, apostrophe, parts of a letter)
S1 Vowel (short, long)
S2 Consonant (variant spelling, silent letter)
S3 Structural Unit (root, suffix)

21st Century Skills

CS1 Global Awareness
CS2 Financial, Economic, Business and Entrepreneurial Literacy
CS3 Civic Literacy
CS7 Critical Thinking and Problem Solving
CS8 Information and Communication Skills
CS9 Information Literacy
CS13 Initiative and Self-Direction

SUGGESTED REFERENCES

Burkart, M., McCann, M., & Paine, D. (2004). *Elevated work platforms and scaffolding*. New York, NY: McGraw-Hill Professional.

Carman, R. A., & Saunders, H. M. (2005). *Mathematics for the trades: A guided approach*. Upper Saddle River, NJ: Pearson Prentice Hall.

Cook, N. P. (2004). *Introductory mathematics*. Upper Saddle River, NJ: Pearson Prentice Hall.

Cook, N. P. (2004). *Mathematics for technical trades*. Upper Saddle River, NJ: Pearson Prentice Hall.

Harman, T. L. (2005). *Guide to the national electric code*. Upper Saddle River, NJ: Prentice Hall.

Hart, G. V. (2008). *Ugly's electrical references*. Houston, TX: Jones Bartlett Publishers.

Henry, T. (n.d.). *Dictionary for the electrician with formulas*. Winter Park, FL: Henry Publications.

Herman, S. L. (2007). *Alternating current fundamentals*. Florence, KY: Cengage Delmar Learning, Inc.

Herman, S. L. (2009). *Delmar's standard textbook of electricity*. Florence, KY: Cengage Delmar Learning, Inc.

Keljik, J. (2009). *Electricity 3: Power generation and delivery*. Florence, KY: Cengage Delmar Learning, Inc.

Keljik, J. (2009). *Electricity 4: AC/DC motors, controls, and maintenance*. Florence, KY: Cengage Delmar Learning, Inc.

Kubala, T. (2009). *Electricity 1: Devices, circuits, and materials*. Florence, KY: Cengage Delmar Learning, Inc.

Kubala, T. (2009). *Electricity 2: Devices, circuits, and materials*. Florence, KY: Cengage Delmar Learning, Inc.

MacDonald, J., Rossnagel, W., & Higgins, L. (2009). *Handbook of rigging*. New York, NY: McGraw-Hill Professional.

Marne, D. (2006, October). *National electrical safety code (NESC) handbook 2007* (2nd ed.). New York, NY: McGraw-Hill Professional.

Mazur, G. A., & Zurlis, P. A. (2003). *Electrical principles and practices*. Homewood, IL: American Technical.

Mullin, R. C., & Smith, R. L. (2005). *Electrical wiring commercial*. Clifton Park, NY: Delmar.

National Center for Construction Education and Research. (2009). *Core curriculum*. Upper Saddle River, NJ: Pearson Prentice Hall.

National Fire Protection Association. (2005). *National electric code*. Clifton Park, NY: Delmar.

Rockis, G., & Mazur, G. (2001). Electrical motor controls. *Homewood, IL: American Technical.*

Shoemaker, T. & Mack, J. (2007). *The lineman's and cableman's handbook* (11th ed.). New York, NY: McGraw-Hill Professional.

Shoemaker, T. & Mack, J. (2009). *The lineman and cablemans field manual* (2nd ed.). New York, NY: McGraw-Hill Professional.

Surbrook, T., & Althouse, J. (2005). *Interpreting the national electric code*. Clifton Park, NY: Delmar.

Titus, P. A., Titus, J. L., & Traister, J. (2002). *Illustrated dictionary for electrical workers*. Albany, NY: Delmar.

Trout, C. (2002). *Electrical installation and inspection*. Albany, NY: Delmar.

VanSoelen, W. (2006). *The guide for linemen and cablemen*. Florence, KY: Cengage Delmar Learning, Inc.

VanSoelen, W. (2007). *The field guide for powerline workers*. Florence, KY: Cengage Delmar Learning, Inc.

Journals and Magazines

Blatt, M. (2009, November–December). Optical communications for improving the performance and reliability of the smart grid. *Electric Energy T&D Magazine, 6*(13). Retrieved December 14, 2009, from http://www.electricenergyonline.com/?page=show_article&mag=60&article=461

Boyle, J. (2009). Aerial lifts. TailGate Safety Topics. Retrieved December 14, 2009, from http://www.incident-prevention.com/component/zine/article/108-aerial-lifts.html

Coveney, M. (2009, November–December). Helping utilities attain sustainability through 'Green IT'. *Electric Energy T&D Magazine, 6*(13). Retrieved December 14, 2009, from http://www.electricenergyonline.com/?page=show_article&mag=60&article=457

Shein, R. (2009, November–December). Security quality and smart grid: The utilities' dilemma. *Electric Energy T&D Magazine, 6*(13). Retrieved December 14, 2009, from http://www.electricenergyonline.com/?page=show_article&mag=60&article=460

Web Sites

Blackboard Academic Suite. (n.d.). Retrieved November 11, 2009, from http://rcu.blackboard.com/webapps/portal/frameset.jsp

Electric Energy Online (2009). *Electric Energy Magazine*, Jaguar Media Inc., Terrebonne, Quebec Canada. Retrieved December 3, 2009, from http://www.electricenergyonline.com/?page=home

E-School News. (n.d.). Retrieved November 12, 2009, from http://www.eschoolnews.com/news/top-news/index.cfm?i=50758

How stuff works. (n.d.). Retrieved November 11, 2009, from http://www.howstuffworks.com/

Kathy Schrock's guide for educators. (n.d.). In discovery education. Retrieved November 11, 2009, from http://school.discoveryeducation.com/schrockguide/

OSHA Instruction. (2003). Enforcement of the electric power generation, transmission, and distribution standard. Retrieved on December 14, 2009, from http://www.osha.gov/OshDoc/Directive_pdf/CPL_2-1_38.pdf

OSHA Construction Regulations. (September, 2008). Retrieved December 3, 2009, from http://www.osha.gov/SLTC/powergeneration/construction.html

Spears, R. (2003). The ruler game. Retrieved on November 11, 2009, from http://www.rickyspears.com/rulergame/

Teacher Vision. (n.d.). Retrieved November 11, 2009, from http://www.teachervision.fen.com/

Tech Learning. (n.d.). Retrieved November 11, 2009, from http://techlearning.com

Vocational Information Center. (n.d.). About vocational education. In Career and technical–vocational education. Retrieved November 11, 2009, from http://www.khake.com/page50.html

Course Name: Advanced Utility Equipment Operation

Course Abbreviation: ULT 2333

Classification: Career – AAS Elective

Description: This course provides an in-depth understanding of the operation of line worker equipment. (3 sch: 2-hr lecture, 2-hr lab)

Pre/Co Requisite		
Basic Utility Equipment Operation (ULT 1333)	**OR**	By consent of instructor

Competencies and Suggested Objectives
1. Demonstrate the safe use and operation of an aerial lift truck. (DOK2, UPP, VWP, MAN, UPT)
2. Demonstrate the safe use and operation of a digger derrick. (DOK2, UPP, VWP, MAN, UPT)
3. Demonstrate the safe use and operation of a trencher/other equipment. (DOK2, UPT, MEC)
4. Demonstrate the safe use and operation of a fork lift. (DOK2, MHE, URG)
5. Demonstrate the safe use and operation of a chainsaw. (DOK2, MEC)
6. Demonstrate the safe use and operation of an ATV/RTV/UTV. (DOK1, MEC)

STANDARDS

UPP Powered platforms, manlifts, and vehicle-mounted work platforms 1910 Subpart F
VWP Vehicle-mounted elevating and rotating work platforms 1910.67
MAN Manlifts 1910.68
UPT Powered industrial trucks 1910.178
CLC Crawler locomotive and truck cranes 1910.180
SLG Slings 1910.184
MHE Material handling equipment 1926.602
URG Rigging equipment for material handling 1926.251
MEC Mechanical equipment 1926.952
CMH Material handling 1926.953
GRD Grounding for protection of employees 1926.954

Related Academic Standards

R1 Interpret Graphic Information (forms, maps, reference sources)
R2 Words in Context (same and opposite meaning)
R3 Recall Information (details, sequence)
R4 Construct Meaning (main idea, summary/paraphrase, compare/contrast, cause/effect)
R5 Evaluate/Extend Meaning (fact/opinion, predict outcomes, point of view)
M1 Addition of Whole Numbers (no regrouping, regrouping)
M2 Subtraction of Whole Numbers (no regrouping, regrouping)
M3 Multiplication of Whole Numbers (no regrouping, regrouping)

M4 Division of Whole Numbers (no remainder, remainder)
M5 Decimals (addition, subtraction, multiplication, division)
M6 Fractions (addition, subtraction, multiplication, division)
M7 Integers (addition, subtraction, multiplication, division)
M8 Percents
M9 Algebraic Operations
A1 Numeration (ordering, place value, scientific notation)
A2 Number Theory (ratio, proportion)
A3 Data Interpretation (graph, table, chart, diagram)
A4 Pre-Algebra and Algebra (equations, inequality)
A5 Measurement (money, time, temperature, length, area, volume)
A6 Geometry (angles, Pythagorean theory)
A7 Computation in Context (whole numbers, decimals, fractions, algebraic operations)
A8 Estimation (rounding, estimation)
L1 Usage (pronoun, tense, subject/verb agreement, adjective, adverb)
L2 Sentence Formation (fragments, run-on, clarity)
L3 Paragraph Development (topic sentence, supporting sentence, sequence)
L4 Capitalization (proper noun, titles)
L5 Punctuation (comma, semicolon)
L6 Writing Conventions (quotation marks, apostrophe, parts of a letter)
S1 Vowel (short, long)
S2 Consonant (variant spelling, silent letter)
S3 Structural Unit (root, suffix)

21st Century Skills

CS1 Global Awareness
CS2 Financial, Economic, Business and Entrepreneurial Literacy
CS3 Civic Literacy
CS7 Critical Thinking and Problem Solving
CS8 Information and Communication Skills
CS9 Information Literacy
CS13 Initiative and Self-Direction

SUGGESTED REFERENCES

Burkart, M., McCann, M., & Paine, D. (2004). *Elevated work platforms and scaffolding*. New York, NY: McGraw-Hill Professional.

Carman, R. A., & Saunders, H. M. (2005). *Mathematics for the trades: A guided approach*. Upper Saddle River, NJ: Pearson Prentice Hall.

Cook, N. P. (2004). *Introductory mathematics*. Upper Saddle River, NJ: Pearson Prentice Hall.

Cook, N. P. (2004). *Mathematics for technical trades*. Upper Saddle River, NJ: Pearson Prentice Hall.

Harman, T. L. (2005). *Guide to the national electric code*. Upper Saddle River, NJ: Prentice Hall.

Hart, G. V. (2008). *Ugly's electrical references*. Houston, TX: Jones Bartlett Publishers.

Henry, T. (n.d.). *Dictionary for the electrician with formulas*. Winter Park, FL: Henry Publications.

Herman, S. L. (2007). *Alternating current fundamentals*. Florence, KY: Cengage Delmar Learning, Inc.

Herman, S. L. (2009). *Delmar's standard textbook of electricity*. Florence, KY: Cengage Delmar Learning, Inc.

Keljik, J. (2009). *Electricity 3: Power generation and delivery*. Florence, KY: Cengage Delmar Learning, Inc.

Keljik, J. (2009). *Electricity 4: AC/DC motors, controls, and maintenance*. Florence, KY: Cengage Delmar Learning, Inc.

Kubala, T. (2009). *Electricity 1: Devices, circuits, and materials*. Florence, KY: Cengage Delmar Learning, Inc.

Kubala, T. (2009). *Electricity 2: Devices, circuits, and materials*. Florence, KY: Cengage Delmar Learning, Inc.

MacDonald, J., Rossnagel, W., & Higgins, L. (2009). *Handbook of rigging*. New York, NY: McGraw-Hill Professional.

Marne, D. (2006, October). *National electrical safety code (NESC) handbook 2007* (2nd ed.). New York, NY: McGraw-Hill Professional.

Mazur, G. A., & Zurlis, P. A. (2003). *Electrical principles and practices*. Homewood, IL: American Technical.

Mullin, R. C., & Smith, R. L. (2005). *Electrical wiring commercial*. Clifton Park, NY: Delmar.

National Center for Construction Education and Research. (2009). *Core curriculum*. Upper Saddle River, NJ: Pearson Prentice Hall.

National Fire Protection Association. (2005). *National electric code*. Clifton Park, NY: Delmar.

Rockis, G., & Mazur, G. (2001). *Electrical motor controls*. Homewood, IL: American Technical.

Shoemaker, T. & Mack, J. (2007). *The lineman's and cableman's handbook* (11th ed.). New York, NY: McGraw-Hill Professional.

Shoemaker, T. & Mack, J. (2009). *The lineman and cableman's field manual* (2nd ed.). New York, NY: McGraw-Hill Professional.

Surbrook, T., & Althouse, J. (2005). *Interpreting the national electric code*. Clifton Park, NY: Delmar.

Titus, P. A., Titus, J. L., & Traister, J. (2002). *Illustrated dictionary for electrical workers*. Albany, NY: Delmar.

Trout, C. (2002). *Electrical installation and inspection*. Albany, NY: Delmar.

VanSoelen, W. (2006). *The guide for linemen and cablemen*. Florence, KY: Cengage Delmar Learning, Inc.

VanSoelen, W. (2007). The field guide for powerline workers. *Florence, KY: Cengage Delmar Learning, Inc.*

Journals and Magazines

Blatt, M. (2009, November–December). Optical communications for improving the performance and reliability of the smart grid. *Electric Energy T&D Magazine, 6*(13). Retrieved December 14, 2009, from http://www.electricenergyonline.com/?page=show_article&mag=60&article=461

Boyle, J. (2009). Aerial lifts. TailGate Safety Topics. Retrieved December 14, 2009, from http://www.incident-prevention.com/component/zine/article/108-aerial-lifts.html

Coveney, M. (2009, November–December). Helping utilities attain sustainability through 'Green IT'. *Electric Energy T&D Magazine, 6*(13). Retrieved December 14, 2009, from http://www.electricenergyonline.com/?page=show_article&mag=60&article=457

Shein, R. (2009, November–December). Security quality and smart grid: The utilities' dilemma. *Electric Energy T&D Magazine, 6*(13). Retrieved December 14, 2009, from http://www.electricenergyonline.com/?page=show_article&mag=60&article=460

Web Sites

Blackboard Academic Suite. (n.d.). Retrieved November 11, 2009, from http://rcu.blackboard.com/webapps/portal/frameset.jsp

Electric Energy Online (2009). *Electric Energy Magazine*, Jaguar Media Inc., Terrebonne, Quebec Canada. Retrieved December 3, 2009, from http://www.electricenergyonline.com/?page=home

E-School News. (n.d.). Retrieved November 12, 2009, from http://www.eschoolnews.com/news/top-news/index.cfm?i=50758

How stuff works. (n.d.). Retrieved November 11, 2009, from http://www.howstuffworks.com/

Kathy Schrock's guide for educators. (n.d.). In discovery education. Retrieved November 11, 2009, from http://school.discoveryeducation.com/schrockguide/

OSHA Instruction. (2003). Enforcement of the electric power generation, transmission, and distribution standard. Retrieved on December 14, 2009, from http://www.osha.gov/OshDoc/Directive_pdf/CPL_2-1_38.pdf

OSHA Construction Regulations. (September, 2008). Retrieved December 3, 2009, from http://www.osha.gov/SLTC/powergeneration/construction.html

Spears, R. (2003). The ruler game. Retrieved on November 11, 2009, from http://www.rickyspears.com/rulergame/

Teacher Vision. (n.d.). Retrieved November 11, 2009, from http://www.teachervision.fen.com/

Tech Learning. (n.d.). Retrieved November 11, 2009, from http://techlearning.com

Vocational Information Center. (n.d.). About vocational education. In Career and technical–vocational education. Retrieved November 11, 2009, from http://www.khake.com/page50.html

Course Name: Special Project I, II, III

Course Abbreviation: ULT 291(1–3), ULT 292(1-3), ULT 293(1–3)

Classification: Career–Technical Elective

Description: Practical application of skills and knowledge gained in other electrical or electrical-related technical courses. The instructor works closely with the student to insure that the selection of a project will enhance the student's learning experience. (1-3 sch: 2-6-hr lab)

Prerequisites: Completion of one semester of course work in Utility Lineworker Technology
OR Consent of instructor

Competencies and Suggested Objectives
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. DOK1
3. Utilize a set of written guidelines for the special project. a. Develop and follow a set of written guidelines for the special project.

STANDARDS

Specific standards for this course will depend upon the nature of the problem under investigation.

STANDARDS

Specific references for this course will depend upon the nature of the problem under investigation.

Course Name: Work-Based Learning I, II, III, IV, V, and VI

Course Abbreviation: WBL 191(1-3), WBL 192(1-3), WBL 193(1-3), WBL 291(1-3), WBL 292(1-3), and WBL 293(1-3)

Classification: Career-Technical Elective

Description: A structured work-site learning experience in which the student, program area teacher, Work-Based Learning Coordinator, and work-site supervisor/mentor develop and implement an educational training agreement. Designed to integrate the student's academic and technical skills into a work environment. Includes regular meetings and seminars with school personnel for supplemental instruction and progress reviews (1-3 sch: 3-9 hr externship)

Prerequisite: Concurrent enrollment in career-technical program area courses

Competencies and Suggested Objectives
1. Apply technical skills and related academic knowledge needed to be a viable member of the workforce. a. Apply technical skills needed to be a viable member of the workforce. b. Apply skills developed in other related courses in a work-based setting. c. Perform tasks detailed in an educational training agreement at the work setting.
2. Apply general workplace skills to include positive work habits and responsibilities necessary for successful employment. a. Demonstrate pro-active human relationship skills in the work setting to include conflict resolution, team participation, leadership, negotiation, and customer/client service. b. Demonstrate time, materials, and resource management skills. c. Demonstrate critical thinking skills such as problem solving, decision making, and reasoning. d. Demonstrate acquiring, evaluating, organizing, maintaining, interpreting, and communicating information. e. Demonstrate positive work habits and acceptance of responsibilities necessary for successful employment.

STANDARDS

Specific standards for this course will depend upon the nature of the problem under investigation.

SUGGESTED REFERENCES

Specific references for use in this course will depend upon the nature of the problem under investigation.

Course Name: Seminar and Planning

Course Abbreviation: CTE 200(1-6)

Classification: Career–Technical Elective

Description: This course is designed to prepare students for program exit certifications and exams, enhance student study skills, and prepare students for entry into the workforce. Development of study principles and skills needed for entry into the workforce. The purpose of this course is to upgrade study skills and habits. Specific skills include, but are not limited to, understanding essential terminology related to the program, time management, listening, note-taking strategies, preparing for exams, and preparing for entry into the workforce. The instructor works closely with the student to ensure that the course enhances the student's learning experiences. (1-6 sch: 45 contact hours per sch)

Prerequisite: Completion of one semester of coursework in related program

Competencies and Suggested Objectives
1. Identify, list, and explain key terms directly related to program exit certification or exam.
2. Develop effective study skills and test-taking practices. a. Explore time-management and goal-setting methods. b. Research effective listening and note-taking procedures. c. Develop effective test-taking strategies in preparation for certification tests or exams.
3. Participate in professional, student, leadership, or service oriented organizations.

STANDARDS

National Standards

National standards in this course will differ depending on the program area.

Related Academic Standards

Related academic standards will differ in this course will differ depending on the program area.

SUGGESTED REFERENCES

Suggested references will differ in this course depending on the program area.

Course Name: Supervised Work Experience I, II

Course Abbreviation: ULT 294(1–3), ULT 295(1–3)

Classification: Career–Technical Elective

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. (1-6 sch: 3-9-hr externship)

Prerequisites: Consent of instructor and completion of at least one semester of advanced coursework in Utility Lineworker Technology

Competencies and Suggested Objectives
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 guidelines for the supervised work experience. a. Develop and follow a set of written guidelines for the supervised work experience.

STANDARDS

Specific references for this course will depend upon the nature of the problem under investigation.

Recommended Tools and Equipment

CAPITALIZED ITEMS

1. Conventional tractors - 3 axle (1 per 4 students)
2. Drop deck trailer (1)
3. Utility truck with derrick (2)

NON-CAPITALIZED ITEMS

RECOMMENDED INSTRUCTIONAL AIDS

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* (2)
9. 12-ft Pike Poles* (1)
10. Nylon Slings* (1)
11. Pulling Grip (may need wire grip and guy grip depends on the type bought)* (10)
12. 18-ft Bolt Cutters* (1)
13. 36-ft BOLT CUTTERS* (1)
14. Cant Hook* (1)
15. Shovel – Round Nose* (1 per student)
16. Transformer Gin (1)
17. Bit – Wood 11/16* (1 per student)
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 per student)
33. Top Straps (1 per student)
34. Top Pads (1 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)

Fall Arrest System
This is the type we use.

BUCKINGHAM BEAM (5203)*

BUCKINGHAM LIFE LINE (5201-50)*

ROPE GRAB (3/4)*

* Will depend on number of students

Tools Students Will Need (one per student)

9-in. KLEIN SIDE CUT PLIERS

12-in. CREASENT WRENCH

SCREWDRIVER

CHANNLOCK PLIERS

RULER

BALL-PEEN HAMMER

HARD HAT

SAFETY GLASSES

WORK GLOVE

Assessment

Blueprint

This program is assessed using the MS-CPAS2. The following blueprint summary contains the competencies that are measured when assessing this program. Competencies are grouped into *clusters*, and a weight is given to each cluster to determine the number of items needed from each cluster.

Appendix A: Industry Standards

Code of Federal Regulations OSHA Standards

Electric power generation, distribution, and transmission hazards are addressed in specific standards for the construction industry. This section highlights OSHA standards, the Regulatory Agenda (a list of actions being taken with regard to OSHA standards), and directives (instructions for compliance officers) and standard interpretations (official letters of interpretation of the standards) related to power transmission and distribution in the construction industry.

General Industry (29 CFR 1910)

RES	Respiratory protection 1910.134
GRD	Guarding floor and wall openings and holes 1910.23
GRE	General requirements (electrical) 1910.303
WMG	Wiring methods, components, and equipment for general use 1910.305
WWS	General requirements (walking working surfaces) 1910.22
PWL	Portable wood ladders 1910.25
PML	Portable metal ladders 1910.26
FLD	Fixed ladders 1910.27
UPP	Powered platforms, manlifts, and vehicle-mounted work platforms 1910 Subpart F
VWP	Vehicle-mounted elevating and rotating work platforms 1910.67
MAN	Manlifts 1910.68
HAZ	Hazardous waste operations and emergency response 1910.120
SPP	General requirements (personal protective equipment)
FAC	Eye and face protection 1910.133
HED	Head protection 1910.135
SFT	Occupational foot protection 1910.136
EPD	Electrical protective devices 1910.137
SHD	Hand protection 1910.138
PCS	Permit Required Confined Spaces 1910.146
SLT	The control of hazardous energy (lockout/tagout) 1910.147
GMH	Materials handling and storage 1910 Subpart N
GHM	Handling materials - general 1910.176
UPT	Powered industrial trucks 1910.178
OGC	Overhead and gantry cranes 1910.179
CLC	Crawler locomotive and truck cranes 1910.180
HET	Helicopters 1910.183
SLG	Slings 1910.184

Construction Industry (29 CFR 1926)

GTD	Electric Power Generation, Transmission, and Distribution 1910.269
SER	Specific excavation requirements 1926.651
RPS	Requirements for protective systems 1926.652

SED Safety training and education 1926.21
SHP Head protection 1926.100
LAD Ladders 1926.1053
SRP Respiratory protection 1910.134
SFP Duty to have fall protection 1926.501
MHE Material handling equipment 1926.602
URG Rigging equipment for material handling 1926.251
USF General safety and health provisions 1926.20
GEN General requirements 1926.950
TPE Tools and protective equipment 1926.951
MEC Mechanical equipment 1926.952
CMH Material handling 1926.953
GRD Grounding for protection of employees 1926.954
OVL Overhead lines 1926.955
UGL Underground lines 1926.956
SUB Construction in energized substations 1926.957
HEL External load helicopters 1926.958
LBB Lineman's body belts, safety straps, and lanyards 1926.959
DEF Definitions applicable to this subpart 1926.960

CONTREN Core

SAF – Basic Safety (MODULE 00101-09)

- Explain the idea of a safety culture and its importance in the construction crafts.
- Identify causes of accidents and the impact of accident costs.
- Explain the role of OSHA in jobsite safety.
- Explain OSHA's General Duty Clause and 1926 CFR Subpart C.
- Recognize hazard recognition and risk assessment techniques.
- Explain fall protection, ladder, stair, and scaffold procedures and requirements.
- Identify struck-by hazards, and demonstrate safe working procedures and requirements.
- Identify caught-in-between hazards, and demonstrate safe working procedures and requirements.
- Define safe work procedures to use around electrical hazards.
- Demonstrate the use and care of appropriate personal protective equipment (PPE).
- Explain the importance of hazard communications (HazCom) and material safety data sheets (MSDSs).
- Identify other construction hazards on your jobsite, including hazardous material exposures, environmental elements, welding and cutting hazards, confined spaces, and fires.

MAT – Introduction to Construction Math (MODULE 00102-09)

- Add, subtract, multiply, and divide whole numbers with and without a calculator.
- Use a standard ruler, a metric ruler, and a measuring tape to measure.
- Add, subtract, multiply, and divide fractions.
- Add, subtract, multiply, and divide decimals with and without a calculator.
- Convert decimals to percentages and percentages to decimals.
- Convert fractions to decimals and decimals to fractions.
- Explain what the metric system is and how it is important in the construction trade.
- Recognize and use metric units of length, weight, volume, and temperature.
- Recognize some of the basic shapes used in the construction industry, and apply basic geometry to measure them.

HTO – Introduction to Hand Tools (MODULE 00103-09)

- Recognize and identify some of the basic hand tools and their proper uses in the construction trade.
- Visually inspect hand tools to determine if they are safe to use.
- Safely use hand tools.

PTO – Introduction to Power Tools (MODULE 00104-09)

- Identify power tools commonly used in the construction trades.
- Use power tools safely.
- Explain how to maintain power tools properly.

BLU – Introduction to Blueprints (MODULE 00105-09)

- Recognize and identify basic blueprint terms, components, and symbols.
- Relate information on blueprints to actual locations on the print.
- Recognize different classifications of drawings.
- Interpret and use drawing dimensions.

RIG – Basic Rigging (MODULE 00106-09)

- Identify and describe the use of slings and common rigging hardware.
- Describe basic inspection techniques and rejection criteria used for slings and hardware.
- Describe basic hitch configurations and their proper connections.
- Describe basic load-handling safety practices.
- Demonstrate proper use of American National Standards Institute (ANSI) hand signals.

COM – Basic Communication Skills (MODULE 00107-09)

- Interpret information and instructions presented in both verbal and written form.
- Communicate effectively in on-the-job situations using verbal and written skills.
- Communicate effectively on the job using electronic communication devices.

EMP – Basic Employability Skills (MODULE 00108-09)

- Explain the role of an employee in the construction industry.
- Demonstrate critical thinking skills and the ability to solve problems using those skills.
- Demonstrate knowledge of computer systems, and explain common uses for computers in the construction industry.
- Define effective relationship skills.
- Recognize workplace issues such as sexual harassment, stress, and substance abuse.

IMH – Introduction to Materials Handling (MODULE 00109-09)

- Define a load.
- Establish a pre-task plan prior to moving a load.
- Use proper materials-handling techniques.
- Choose appropriate materials-handling equipment for the task.
- Recognize hazards and follow safety procedures required for materials handling.

CONTREN Electricity

ELT1.2 – Electrical Safety
ELT1.4 – Electrical Theory
ELT1.5 – Introduction to the National Electrical Code
ELT1.12 – Electrical Test Equipment
ELT2.1 – Alternating Current
ELT2.2 – Motors: Theory and Application
ELT3.7 – Transformers

Mississippi Professional Driver's Manual

2006 Mississippi Professional Driver's Manual for Class A, B, & C Commercial Driver's License, Department of Public Safety, State of Mississippi

DTV1 – General Knowledge
DTV2 – Air Brakes
DTV3 – Combination Vehicles

Appendix B: Related Academic Standards[1]

Reading

R1 Interpret Graphic Information (forms, maps, reference sources)
R2 Words in Context (same and opposite meaning)
R3 Recall Information (details, sequence)
R4 Construct Meaning (main idea, summary/paraphrase, compare/contrast, cause/effect)
R5 Evaluate/Extend Meaning (fact/opinion, predict outcomes, point of view)

Mathematics Computation

M1 Addition of Whole Numbers (no regrouping, regrouping)
M2 Subtraction of Whole Numbers (no regrouping, regrouping)
M3 Multiplication of Whole Numbers (no regrouping, regrouping)
M4 Division of Whole Numbers (no remainder, remainder)
M5 Decimals (addition, subtraction, multiplication, division)
M6 Fractions (addition, subtraction, multiplication, division)
M7 Integers (addition, subtraction, multiplication, division)
M8 Percents
M9 Algebraic Operations

Applied Mathematics

A1 Numeration (ordering, place value, scientific notation)
A2 Number Theory (ratio, proportion)
A3 Data Interpretation (graph, table, chart, diagram)
A4 Pre-Algebra and Algebra (equations, inequality)
A5 Measurement (money, time, temperature, length, area, volume)
A6 Geometry (angles, Pythagorean theory)
A7 Computation in Context (whole numbers, decimals, fractions, algebraic operations)
A8 Estimation (rounding, estimation)

Language

L1 Usage (pronoun, tense, subject/verb agreement, adjective, adverb)
L2 Sentence Formation (fragments, run-on, clarity)
L3 Paragraph Development (topic sentence, supporting sentence, sequence)
L4 Capitalization (proper noun, titles)
L5 Punctuation (comma, semicolon)
L6 Writing Conventions (quotation marks, apostrophe, parts of a letter)

Spelling

S1 Vowel (short, long)
S2 Consonant (variant spelling, silent letter)
S3 Structural Unit (root, suffix)

[1] CTB/McGraw-Hill LLC. (2005). *Tests of adult basic education, forms 9 and 10.* Monterey, CA: Author.

Appendix C: 21st Century Skills[2]

CSS1-21st Century Themes

CS1 Global Awareness

1. Using 21st century skills to understand and address global issues
2. Learning from and working collaboratively with individuals representing diverse cultures, religions and lifestyles in a spirit of mutual respect and open dialogue in personal, work and community contexts
3. Understanding other nations and cultures, including the use of non-English languages

CS2 Financial, Economic, Business and Entrepreneurial Literacy

1. Knowing how to make appropriate personal economic choices
2. Understanding the role of the economy in society
3. Using entrepreneurial skills to enhance workplace productivity and career options

CS3 Civic Literacy

1. Participating effectively in civic life through knowing how to stay informed and understanding governmental processes
2. Exercising the rights and obligations of citizenship at local, state, national and global levels
3. Understanding the local and global implications of civic decisions

CS4 Health Literacy

1. Obtaining, interpreting and understanding basic health information and services and using such information and services in ways that enhance health
2. Understanding preventive physical and mental health measures, including proper diet, nutrition, exercise, risk avoidance and stress reduction
3. Using available information to make appropriate health-related decisions
4. Establishing and monitoring personal and family health goals
5. Understanding national and international public health and safety issues

CS5 Environmental Literacy

1. Demonstrate knowledge and understanding of the environment and the circumstances and conditions affecting it, particularly as relates to air, climate, land, food, energy, water and ecosystems
2. Demonstrate knowledge and understanding of society's impact on the natural world (e.g., population growth, population development, resource consumption rate, etc.)
3. Investigate and analyze environmental issues, and make accurate conclusions about effective solutions
4. Take individual and collective action towards addressing environmental challenges (e.g., participating in global actions, designing solutions that inspire action on environmental issues)

[2] *21st century skills.* (n.d.). Washington, DC: Partnership for 21st Century Skills.

CSS2-Learning and Innovation Skills

CS6 Creativity and Innovation
1. Think Creatively
2. Work Creatively with Others
3. Implement Innovations

CS7 Critical Thinking and Problem Solving
1. Reason Effectively
2. Use Systems Thinking
3. Make Judgments and Decisions
4. Solve Problems

CS8 Communication and Collaboration
1. Communicate Clearly
2. Collaborate with Others

CSS3-Information, Media and Technology Skills

CS9 Information Literacy
1. Access and Evaluate Information
2. Use and Manage Information

CS10 Media Literacy
1. Analyze Media
2. Create Media Products

CS11 ICT Literacy
1. Apply Technology Effectively

CSS4-Life and Career Skills

CS12 Flexibility and Adaptability
1. Adapt to Change
2. Be Flexible

CS13 Initiative and Self-Direction
1. Manage Goals and Time
2. Work Independently
3. Be Self-directed Learners

CS14 Social and Cross-Cultural Skills
1. Interact Effectively with Others
2. Work Effectively in Diverse Teams

CS15 Productivity and Accountability
1. Manage Projects
2. Produce Results

CS16 Leadership and Responsibility
1. Guide and Lead Others
2. Be Responsible to Others