

# Course Outline

Energy, Environment, and Utilities

REVISED: January/2018

**Job Title**

Electrical Powerline Mechanic

**72-75-80**

**Career Pathway:**

Energy and Power Technology

**Powerline Systems/1**

**Industry Sector:**

Energy, Environment, and Utilities

**Credits:** 5

**Hours:** 90

**O\*NET-SOC CODE:**

49-9051.00

**Course Description:**

This competency-based course is the first in a sequence of three designed for powerline technology. Instruction includes an orientation, workplace safety policies and procedures, resource management, trade mathematics, and employability skills. Emphasis is placed on the theories and general applications of direct current (DC), alternating current (AC), capacitance, and inductance. The competencies in this course are aligned with the California High School Academic Content Standards and the California Career Technical Education Model Curriculum Standards.

**CBEDS Title:**

Principles of Power and Energy

**Prerequisites:**

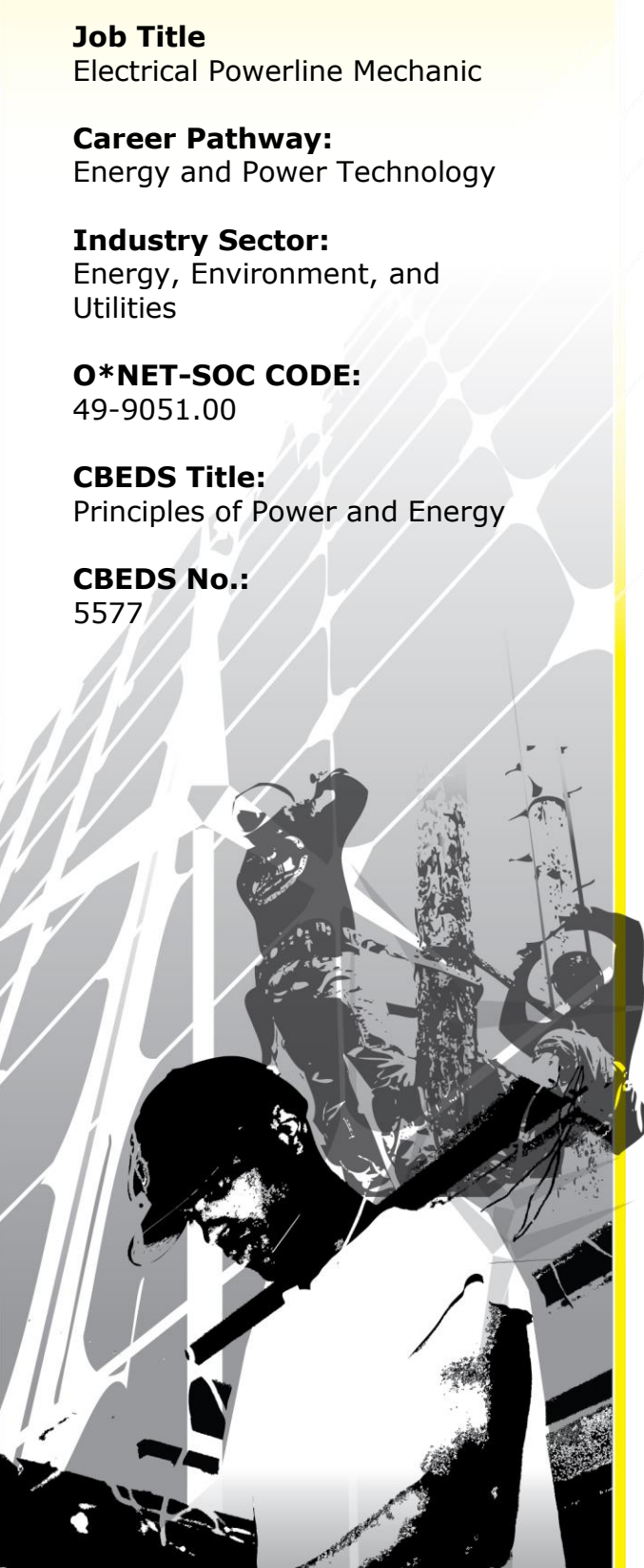
Enrollment requires a reading level of 6.0 as measured by the TABE D 9/10.

**CBEDS No.:**

5577

**NOTE:** For Perkins purposes this course has been designated as an **introductory** course.

This course cannot be repeated once a student receives a Certificate of Completion.



## **COURSE OUTLINE COMPETENCY-BASED COMPONENTS**

A course outline reflects the essential intent and content of the course described. Acceptable course outlines have six components. (Education Code Section 52506). Course outlines for all apportionment classes, including those in jails, state hospitals, and convalescent hospitals, contain the six required elements:

(EC 52504; 5CCR 10508 [b]; Adult Education Handbook for California [1977], Section 100)

### **COURSE OUTLINE COMPONENTS**

### **LOCATION**

#### **GOALS AND PURPOSES**

Cover

The educational goals or purposes of every course are clearly stated and the class periods are devoted to instruction. The course should be broad enough in scope and should have sufficient educational worth to justify the expenditure of public funds.

The goals and purpose of a course are stated in the COURSE DESCRIPTION. Course descriptions state the major emphasis and content of a course, and are written to be understandable by a prospective student.

#### **PERFORMANCE OBJECTIVES OR COMPETENCIES**

pp. 7-13

Objectives should be delineated and described in terms of measurable results for the student and include the possible ways in which the objectives contribute to the student's acquisition of skills and competencies.

Performance Objectives are sequentially listed in the COMPETENCY-BASED COMPONENTS section of the course outline. Competency Areas are units of instruction based on related competencies. Competency Statements are competency area goals that together define the framework and purpose of a course. Competencies fall on a continuum between goals and performance objectives and denote the outcome of instruction.

Competency-based instruction tells a student before instruction what skills or knowledge they will demonstrate after instruction. Competency-based education provides instruction which enables each student to attain individual goals as measured against pre-stated standards.

Competency-based instruction provides immediate and continual repetition and in competency-based education the curriculum, instruction, and assessment share common characteristics based on clearly stated competencies. Curriculum, instruction and assessment in competency-based education are: explicit, known, agreed upon, integrated, performance oriented, and adaptive.

**COURSE OUTLINE COMPETENCY-BASED COMPONENTS**  
**(continued)**

<b>COURSE OUTLINE COMPONENTS</b>	<b>LOCATION</b>
<b>INSTRUCTIONAL STRATEGIES</b>	p. 15
<p>Instructional techniques or methods could include laboratory techniques, lecture method, small-group discussion, grouping plans, and other strategies used in the classroom.</p> <p>Instructional strategies for this course are listed in the TEACHING STRATEGIES AND EVALUATION section of the course outline. Instructional strategies and activities for a course should be selected so that the overall teaching approach takes into account the instructional standards of a particular program, i.e., English as a Second Language, Programs for Adults with Disabilities.</p>	
<b>UNITS OF STUDY, WITH APPROXIMATE HOURS ALLOTTED FOR EACH UNIT</b>	Cover
<p>The approximate time devoted to each instructional unit within the course, as well as the total hours for the course, is indicated. The time in class is consistent with the needs of the student, and the length of the class should be that it ensures the student will learn at an optimum level.</p> <p>Units of study, with approximate hours allotted for each unit are listed in the COMPETENCY AREA STATEMENT(S) of the course outline. The total hours of the course, including work-based learning hours (community classroom and cooperative vocational education) is listed on the cover of every CBE course outline. Each Competency Area listed within a CBE outline is assigned hours of instruction per unit.</p>	
<b>EVALUATION PROCEDURES</b>	p. 15
<p>The evaluation describes measurable evaluation criteria clearly within the reach of the student. The evaluation indicates anticipated improvement in performances as well as anticipated skills and competencies to be achieved.</p> <p>Evaluation procedures are detailed in the TEACHING STRATEGIES AND EVALUATION section of the course outline. Instructors monitor students' progress on a continuing basis, assessing students on attainment of objectives identified in the course outline through a variety of formal and informal tests (applied performance procedures, observations, and simulations), paper and pencil exams, and standardized tests.</p>	
<b>REPETITION POLICY THAT PREVENTS PERPETUATION OF STUDENT ENROLLMENT</b>	Cover
<p>After a student has completed all the objectives of the course, he or she should not be allowed to reenroll in the course. There is, therefore, a need for a statement about the conditions for possible repetition of a course to prevent perpetuation of students in a particular program for an indefinite period of time.</p>	

## **ACKNOWLEDGMENTS**

Thanks to ROBERT ESTRADA, ALMA ALVAREZ, and ALEJANDRA SALCEDO for developing and editing this curriculum. Acknowledgment is also given to ERICA ROSARIO for designing the original artwork for the course covers.

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# **CALIFORNIA CAREER TECHNICAL EDUCATION MODEL CURRICULUM STANDARDS**

## ***Energy, Environment and Utilities Industry Sector***

### ***Knowledge and Performance Anchor Standards***

#### **1.0 Academics**

Analyze and apply appropriate academic standards required for successful industry sector pathway completion leading to postsecondary education and employment. Refer to the Energy, Environment, and Utilities academic alignment matrix for identification of standards.

#### **2.0 Communications**

Acquire, and accurately use Energy, Environment, and Utilities sector terminology and protocols at the career and college readiness level for communicating effectively in oral, written, and multimedia formats.

#### **3.0 Career Planning and Management**

Integrate multiple sources of career information from diverse formats to make informed career decisions, solve problems, and manage personal career plans.

#### **4.0 Technology**

Use existing and emerging technology to investigate, research, and produce products and services, including new information, as required in the Energy, Environment, and Utilities sector workplace environment.

#### **5.0 Problem Solving and Critical Thinking**

Conduct short, as well as more sustained, research to create alternative solutions to answer a question or solve a problem unique to the Energy, Environment, and Utilities sector using critical and creative thinking; logical reasoning, analysis, inquiry, and problem-solving techniques.

#### **6.0 Health and Safety**

Demonstrate health and safety procedures, regulations, and personal health practices and determine the meaning of symbols, key terms, and domain-specific words and phrases as related to the Energy, Environment, and Utilities sector workplace environment.

#### **7.0 Responsibility and Flexibility**

Initiate, and participate in, a range of collaborations demonstrating behaviors that reflect personal and professional responsibility, flexibility, and respect in the Energy, Environment, and Utilities sector workplace environment and community settings.

#### **8.0 Ethics and Legal Responsibilities**

Practice professional, ethical, and legal behavior, responding thoughtfully to diverse perspectives and resolving contradictions when possible, consistent with applicable laws, regulations, and organizational norms.

#### **9.0 Leadership and Teamwork**

Work with peers to promote divergent and creative perspectives, effective leadership, group dynamics, team and individual decision making, benefits of workforce diversity, and conflict resolution as practiced in the SkillsUSA career technical student organization.

#### **10.0 Technical Knowledge and Skills**

Apply essential technical knowledge and skills common to all pathways in the Energy, Environment, and Utilities sector.

#### **11.0 Demonstration and Application**

Demonstrate and apply the knowledge and skills contained in the Energy, Environment, and Utilities anchor standards, pathway standards, and performance indicators in classroom, laboratory, and workplace settings, and through the SkillsUSA career technical student organization.

## ***Energy, Environment, and Utilities Sector Pathway Standards***

### **B. Energy and Power Technology Pathway**

The Energy and Power Technology pathway provides learning opportunities for students interested in preparing for careers in the energy and power industries.

Sample occupations associated with this pathway:

- ◆ Energy Efficiency Evaluation Specialist
- ◆ Energy Engineer
- ◆ Energy Generation/Power Distribution, Maintenance, Inspection, and Repair Technicians
- ◆ Energy/Building Retrofit Specialist
- ◆ Plant/Field Weatherization Installer

- B1.0 Explore the basic conventional and emerging principles and concepts of the energy industry, including energy production, energy transmission, and alternative energy technologies.
- B2.0 Identify various conventional electric power generation fuel sources and the cost and efficiency issues associated with each.
- B3.0 Investigate emerging and alternative electric power generation technologies and fuel sources.
- B4.0 Understand nonnuclear power generation plant operations (coal, oil, natural gas, solar, wind, geothermal power, hydroelectric, or biofuel).
- B5.0 Understand and apply basic knowledge and skills necessary for nuclear power generation and nuclear power plant personnel.
- B6.0 Research methods of energy procurement, transmission, distribution, and storage.
- B7.0 Understand the interrelationships among components of systems.

**CBE**  
**Competency-Based Education**

**COMPETENCY-BASED COMPONENTS**  
**for the Powerline Systems/1 Course**

COMPETENCY AREAS AND STATEMENTS	MINIMAL COMPETENCIES	STANDARDS
<p>A. ORIENTATION AND SAFETY</p> <p>Understand and evaluate classroom and workplace policies and procedures used in accordance with federal, state, and local safety and environmental regulations.</p> <p>(5 hours)</p>	<ol style="list-style-type: none"> <li>1. Describe the scope and purpose of the course.</li> <li>2. Describe the overall course content as a part of the Linked Learning Initiative.</li> <li>3. Describe classroom policies and procedures.</li> <li>4. Describe classroom and workplace first aid and emergency procedures based on the American Red Cross (ARC) standards.</li> <li>5. Describe the different occupations in the Energy and Utilities Industry Sector which have an impact on the role of powerline mechanics.</li> <li>6. Describe the opportunities available for promoting gender equity and the representation of non-traditional populations in the powerline systems field.</li> <li>7. Describe the purpose of the California Occupational Safety and Health Administration (Cal/OSHA) and its laws governing powerline mechanics.</li> <li>8. Describe the impact of Environmental Protection Agency (EPA) legislation on the Energy, Environment and Utilities Industry Sector practices.</li> <li>9. Describe and demonstrate the procedures for contacting proper authorities for the removal of hazardous materials based on the EPA standards.</li> <li>10. Describe the National Electrical Code (NEC) and its role in safeguarding the work conditions of powerline mechanics.</li> <li>11. Describe and demonstrate the use of the Material Safety Data Sheet (MSDS) as it applies to the powerline systems.</li> <li>12. Describe the role of the Leadership in Energy and Environmental Design (LEED) Green Building Rating System™ in increasing the use of clean and renewable technology in California.</li> <li>13. Describe the City of Los Angeles Building and Safety Codes and their applications to the powerline systems.</li> <li>14. Describe the provisions of the California Title 24 Energy Efficiency Standards (a.k.a. 2008 California Green Building Standards Code) as they relate to the Energy, Environment and Utilities Industry Sector.</li> </ol>	<p><b>Career Ready Practice:</b> 1, 3, 6, 8, 9, 11, 12</p> <p><b>CTE Anchor:</b> Communications: 2.1, 2.2, 2.3, 2.4 Problem Solving and Critical Thinking: 5.1, 5.4 Health and Safety: 6.1, 6.2, 6.3, 6.4, 6.5, 6.6, 6.7, 6.8, 6.9, 6.11, 6.12, 6.13, 6.14, 6.15, 6.16 Ethics and Legal Responsibilities: 8.1, 8.2, 8.3, 8.4, 8.5 Leadership and Teamwork: 9.6 Technical Knowledge and Skills: 10.1, 10.2</p> <p><b>CTE Pathway:</b> B1.7</p>

COMPETENCY AREAS AND STATEMENTS	MINIMAL COMPETENCIES	STANDARDS
<p>B. RESOURCE MANAGEMENT</p> <p>Understand resource management principles and techniques applied in the powerline field.</p> <p>(1 hour)</p>	<ol style="list-style-type: none"> <li>1. Define the following:               <ol style="list-style-type: none"> <li>a. resources</li> <li>b. management</li> <li>c. sustainability</li> </ol> </li> <li>2. Describe the management of the following resources in the powerline field:               <ol style="list-style-type: none"> <li>a. time</li> <li>b. materials (including sustainable and green)</li> <li>c. personnel</li> </ol> </li> <li>3. List specific examples of effective management of the following resources in the powerline field:               <ol style="list-style-type: none"> <li>a. time</li> <li>b. materials (including sustainable and green)</li> <li>c. personnel</li> </ol> </li> <li>4. Describe the benefits of effective resource management in the powerline field:               <ol style="list-style-type: none"> <li>a. profitability</li> <li>b. sustainability</li> <li>c. company growth</li> </ol> </li> <li>5. Describe the economic benefits and liabilities of managing resources in an environmentally responsible way.</li> </ol>	<p><b>Career Ready Practice:</b> 1, 3, 5, 8, 10</p> <p><b>CTE Anchor:</b> Communications: 2.1, 2.2, 2.3 Career Planning and Management: 3.2 Problem Solving and Critical Thinking: 5.1, 5.2, 5.3, 5.4 Responsibility and Flexibility: 7.1, 7.2, 7.3, 7.4, 7.5, 7.6, 7.7 Ethics and Legal Responsibilities: 8.1, 8.3, 8.4, 8.5 Leadership and Teamwork: 9.1, 9.2</p> <p><b>CTE Pathway:</b> B1.6, B1.7</p>
<p>C. TRADE MATHEMATICS</p> <p>Understand and apply the mathematical requirements in the Powerline field.</p>	<ol style="list-style-type: none"> <li>1. Describe the practical applications of math in the powerline field.</li> <li>2. Describe and demonstrate problem-solving techniques involving whole number problems using arithmetic operations (addition, subtraction, multiplication, and division).</li> <li>3. Describe and demonstrate problem-solving techniques involving various fraction problems using arithmetic operations.</li> <li>4. Describe and demonstrate problem-solving techniques involving various decimal problems using addition, subtraction, multiplication, and division.</li> <li>5. Describe and demonstrate techniques for changing fractions to decimals.</li> <li>6. Describe and demonstrate techniques for changing decimals to fractions.</li> <li>7. Describe the English and metric systems of measuring length.</li> <li>8. Describe the English and metric systems of measuring weight.</li> <li>9. Describe the English and metric systems of measuring volume or capacity.</li> <li>10. Describe and demonstrate English and metric problem-solving techniques for various measuring problems using arithmetic operations.</li> </ol>	<p><b>Career Ready Practice:</b> 1, 3, 5</p> <p><b>CTE Anchor:</b> Communications; 2.1, 2.2, 2.3, 2.4 Problem Solving and Critical Thinking: 5.1, 5.2, 5.3, 5.4</p> <p><b>CTE Pathway:</b> B1.8, B2.4, B7.6</p>



COMPETENCY AREAS AND STATEMENTS	MINIMAL COMPETENCIES	STANDARDS
(20 hours)	11. Describe and demonstrate English and metric measuring techniques of objects by using tools common to the trade. 12. Express units in ascending and descending powers of ten. 13. Convert the English numbering system to metric system. 14. Convert metric system to English numbering system. 15. Calculate square roots of English numbers. 16. Describe and demonstrate problem-solving techniques for geometric problems. 17. Describe and demonstrate problem-solving techniques for algebraic problems. 18. Describe and demonstrate problem-solving techniques using percentages. 19. Describe and demonstrate techniques for reading and interpreting graphs. 20. Describe and demonstrate techniques for using a calculator. 21. Pass utility entry level exam	
D. DIRECT CURRENT (DC) THEORY I  Understand, apply, and evaluate the DC theory as it relates to the trade.	1. Define the following: a. matter b. atoms c. electrons d. molecules e. conductor i. nonmetallic ii. metallic f. electrical charges g. electricity h. electrostatic fields i. dielectric fields j. electrostatic induction k. static electricity l. energy m. potential energy n. kinetic energy o. binding energy p. work q. magnetism r. electromagnetism s. current (a.k.a. amperage) t. direct current (DC) u. voltage v. power (a.k.a. watts) w. resistance (a.k.a. ohms) x. Ohm's Law y. circuit parameters z. simple circuits aa. series circuits bb. parallel circuits	<b>Career Ready Practice:</b> 1, 3, 5  <b>CTE Anchor:</b> Communication: 2.1, 2.2, 2.3, 2.4 Problem Solving and Critical Thinking: 5.1, 5.2, 5.3, 5.4 Health and Safety: 6.15 Technical Knowledge and Skills: 10.1, 10.2  <b>CTE Pathway:</b> B1.3, B1.4, B7.3, B7.4, B7.5, B7.6

COMPETENCY AREAS AND STATEMENTS	MINIMAL COMPETENCIES	STANDARDS
(15 hours)	<ol style="list-style-type: none"> <li>2. Describe the features and functions of the following:               <ol style="list-style-type: none"> <li>a. resistors</li> <li>b. potentiometers</li> <li>c. switches</li> <li>d. fuses</li> <li>e. relays</li> <li>f. batteries</li> </ol> </li> <li>3. Describe the following:               <ol style="list-style-type: none"> <li>a. electromagnetic properties</li> <li>b. relationship between electricity and magnetism</li> </ol> </li> <li>4. Describe and demonstrate the following:               <ol style="list-style-type: none"> <li>a. construction of a simple electromagnet</li> <li>b. designing direct current circuits with components such as resistors, relays, switches, lamps, batteries, and capacitors, using schematic diagrams</li> <li>c. drawing a schematic diagram from a wiring diagram</li> <li>d. measuring current using a multimeter</li> <li>e. measuring voltage using a multimeter</li> <li>f. measuring resistance using a multimeter</li> <li>g. building an original basic direct current circuit</li> <li>h. using Ohm's Law to calculate circuit parameters for a series circuit</li> </ol> </li> </ol>	
<p>E. ALTERNATING CURRENT (AC) THEORY I</p> <p>Understand, apply, and evaluate the alternating current (AC) theory as it relates to the trade.</p>	<ol style="list-style-type: none"> <li>1. Define the following:               <ol style="list-style-type: none"> <li>a. alternating current (AC)</li> <li>b. waveform</li> <li>c. sine waves</li> <li>d. triangular waves</li> <li>e. square waves</li> <li>f. power ratio</li> <li>g. transformer</li> <li>h. resistive circuit</li> <li>i. phase relationships</li> <li>j. Root Mean Square (RMS)</li> </ol> </li> <li>2. Describe the following:               <ol style="list-style-type: none"> <li>a. difference between AC and DC</li> <li>b. operation of a basic alternating current signal</li> <li>c. values of sine waves                   <ol style="list-style-type: none"> <li>i. instantaneous value</li> <li>ii. average value</li> <li>iii. effective value</li> <li>iv. frequency</li> </ol> </li> <li>a. phase relationships of alternating current                   <ol style="list-style-type: none"> <li>i. single-phase electricity</li> <li>ii. two-phase electricity</li> <li>iii. three-phase electricity</li> </ol> </li> <li>b. relationship of current and voltage</li> <li>c. concept of non-sinusoidal waveforms</li> </ol> </li> </ol>	<p><b>Career Ready Practice:</b> 1, 3, 5, 11</p> <p><b>CTE Anchor:</b> Communications: 2.1, 2.2, 2.3, 2.4 Problem Solving and Critical Thinking: 5.1, 5.2, 5.3, 5.5 Ethics and Legal Responsibilities: 8.2 Technical Knowledge and Skills: 10.1</p> <p><b>CTE Pathway:</b> B1.1, B1.2, B1.3, B1.5, B1.8, B6.1, B6.2, B6.3, B6.4, B7.2, B7.3, B7.4, B7.5</p>

COMPETENCY AREAS AND STATEMENTS	MINIMAL COMPETENCIES	STANDARDS
(15 hours)	<ul style="list-style-type: none"> <li>d. fluctuating DC and AC waveforms</li> <li>e. properties and characteristics of transformers</li> <li>f. reasons for transformer power loss</li> <li>g. application of fixed, variable, multi-tapped, and auto transformers</li> <li>h. common failures of transformers</li> </ul> <p>3. Describe the features and functions of the following types of transformers:</p> <ul style="list-style-type: none"> <li>a. step-up transformer</li> <li>b. step-down transformer</li> <li>c. isolation transformer</li> <li>d. autotransformer</li> </ul> <p>4. Describe and demonstrate the following:</p> <ul style="list-style-type: none"> <li>a. identify the operating conditions important to the transformer</li> <li>b. compare the input and output power of a transformer</li> <li>c. calculate the efficiency of transformers</li> <li>d. describe the nameplate information on transformer</li> <li>e. calculate the input and output currents of transformers</li> </ul>	
<p>F. CAPACITANCE I</p> <p>Understand, apply, and evaluate the effects of capacitance in direct and alternating current circuits.</p> <p>(15 hours)</p>	<ul style="list-style-type: none"> <li>1. Define the following: <ul style="list-style-type: none"> <li>a. capacitance</li> <li>b. capacitor</li> <li>c. capacitive circuit</li> </ul> </li> <li>2. Describe the following: <ul style="list-style-type: none"> <li>a. three physical factors which determine capacitance</li> <li>b. unit of capacitance</li> <li>c. properties and characteristics of capacitors</li> <li>d. effects of capacitance in DC circuits</li> <li>e. effects of capacitance in AC circuits</li> <li>f. characteristics of various capacitor types</li> <li>g. the effects of a capacitor on series and parallel circuits</li> <li>h. effects of frequency on capacitive reactance</li> <li>i. relationship between phase angle and the values of resistance and capacitance reactance</li> <li>j. impedance</li> <li>k. effect of frequency on impedance</li> <li>l. RC high and low pass filters</li> <li>m. common failures of capacitors</li> </ul> </li> <li>3. Describe and demonstrate the following: <ul style="list-style-type: none"> <li>a. reading the values of a capacitor</li> <li>b. determining the resistance capacitance (RC) time constant for a circuit, given the values of resistance and capacitance</li> <li>c. calculating the value of capacitive reactance given the values of capacitance and frequency</li> </ul> </li> </ul>	<p><b>Career Ready Practice:</b> 1, 3, 5</p> <p><b>CTE Anchor:</b> Communications: 2.1, 2.2, 2.3 Problem Solving and Critical Thinking: 5.1, 5.2, 5.3, 5.4 Ethics and Legal Responsibilities: 8.2 Technical Knowledge and Skills: 10.1, 10.2</p> <p><b>CTE Pathway:</b> B1.7, B6.1, B6.2, B6.3, B6.4, B7.3, B7.4, B7.5</p>

COMPETENCY AREAS AND STATEMENTS	MINIMAL COMPETENCIES	STANDARDS
<p>G. INDUCTANCE I</p> <p>Understand and apply basic electrical theories.</p> <p>(15 hours)</p>	<ol style="list-style-type: none"> <li>1. Define the following:               <ol style="list-style-type: none"> <li>a. inductance</li> <li>b. inductors</li> <li>c. inductive circuit</li> <li>d. self-induction</li> </ol> </li> <li>2. Describe the following:               <ol style="list-style-type: none"> <li>a. four physical factors which determine inductance</li> <li>b. unit of inductance</li> <li>c. properties and characteristics of inductors</li> <li>d. effects of inductance in DC circuits</li> <li>e. effects of inductance in AC circuits</li> <li>f. effects of inductance on series and parallel circuits</li> <li>g. effects of frequency on inductive reactance</li> <li>h. relationship between phase angle and inductive reactance</li> <li>i. LR high and low pass filters</li> <li>j. common failures of inductors</li> </ol> </li> <li>3. Describe and demonstrate the following:               <ol style="list-style-type: none"> <li>a. inductance resistance (LR) time constant for a circuit, given the values of resistance and inductance</li> <li>b. calculate inductive reactance, given the values of inductance and frequency</li> <li>c. basic construction of an inductor</li> </ol> </li> </ol>	<p><b>Career Ready Practice:</b> 1, 3, 5</p> <p><b>CTE Anchor:</b> Communications: 2.1, 2.2, 2.3 Problem Solving and Critical Thinking: 5.1, 5.2, 5.3, 5.4 Ethics and Legal Responsibilities: 8.2 Technical Knowledge and Skills: 10.1, 10.2</p> <p><b>CTE Pathway:</b> B1.7, B6.1, B6.2, B6.3, B6.4, B7.1, B7.3, B7.4, B7.</p>
<p>H. EMPLOYABILITY SKILLS</p> <p>Understand, apply, and evaluate the employability skills required in the Powerline field.</p>	<ol style="list-style-type: none"> <li>1. Describe employer requirements for the following:               <ol style="list-style-type: none"> <li>a. punctuality</li> <li>b. attendance</li> <li>c. attitude toward work</li> <li>d. quality of work</li> <li>e. teamwork</li> <li>f. timeliness</li> <li>g. communication skills</li> <li>h. computer skills and software applications</li> </ol> </li> <li>2. Identify potential employers through traditional and internet sources.</li> <li>3. Describe the role of electronic social media in job search.</li> <li>4. Design sample résumés and cover letters.</li> <li>5. Describe the importance of filling out a job application legibly, with accurate and complete information.</li> <li>6. Complete sample job application forms correctly.</li> <li>7. Describe the importance of enthusiasm on a job.</li> <li>8. Describe the importance of appropriate appearance on a job.</li> <li>9. Describe the importance of the continuous upgrading of job skills.</li> <li>10. Describe customer service as a method of building permanent relationships between the organization and the customer.</li> <li>11. Describe and demonstrate appropriate interviewing techniques.</li> </ol>	<p><b>Career Ready Practice:</b> 1, 2, 3, 7, 8, 9, 10, 11</p> <p><b>CTE Anchor:</b> Communications: 2.1, 2.2, 2.3, 2.4, 2.5 Career Planning and Management: 3.1, 3.2, 3.3, 3.4, 3.5, 3.6 Technology: 4.1, 4.2, 4.3, 4.6 Problem Solving and Critical Thinking: 5.1, 5.2, 5.3, 5.4 Responsibility and Flexibility: 7.3, 7.4, 7.6, 7.7 Ethics and Legal Responsibilities: 8.1, 8.3, 8.4, 8.5</p>

COMPETENCY AREAS AND STATEMENTS	MINIMAL COMPETENCIES	STANDARDS
(4 hours)	12. Identify the informational materials and resources needed to be successful in an interview. 13. Design sample follow-up letters. 14. Describe and demonstrate appropriate follow-up procedures.	Leadership and Teamwork: 9.1, 9.2, 9.3, 9.4, 9.6 Technical Knowledge and Skills: 10.1 Demonstration and Application: 11.1, 11.2, 11.4, 11.5  <b>CTE Pathway:</b> B1.1, B1.2

## ***SUGGESTED INSTRUCTIONAL MATERIALS and OTHER RESOURCES***

### **TEXTS AND SUPPLEMENTAL BOOKS**

Deb, Anjab K. Powerline Ampacity System: Theory, Modeling and Applications. Taylor and Francis, Inc., 2000.

Shoemaker Thomas M. and James E, Mack. Lineman's and Cableman's Field Manual. McGraw-Hill Companies, 2009.

Shoemaker Thomas M. and James E, Mack. Lineman's and Cableman's Handbook. McGraw-Hill Companies, 2006.

Van Soelen, Wayne. Electrical Essentials for Powerline Workers. Cengage Learning, 2005.

### **RESOURCES**

Employer Advisory Board members

CTE Model Curriculum Standards

<http://www.cde.ca.gov/ci/ct/sf/documents/energyutilities.pdf>

[www.americangreenjobs.net](http://www.americangreenjobs.net)

<http://www.renewableenergyjobs.com/>

<http://careers.pennenergyjobs.com>

<http://www.cleantechrecruits.com>

[www.seia.org](http://www.seia.org)

[www1.eere.energy.gov](http://www1.eere.energy.gov)

### **COMPETENCY CHECKLIST**

## ***TEACHING STRATEGIES and EVALUATION***

### **METHODS AND PROCEDURES**

- A. Lecture and discussion
- B. Multimedia presentations
- C. Demonstrations and participations
- D. Individualized instruction
- E. Peer teaching
- F. Role-playing
- G. Guest speakers
- H. Field trips and field study experiences
- I. Projects

### **EVALUATION**

SECTION A – Orientation and Safety – Pass the safety test with 100% accuracy.

SECTION B – Resource Management – Pass all assignments and exams on resource management with a minimum score of 80% or higher.

SECTION C – Trade Mathematics – Pass all assignments and exams on trade mathematics with a minimum score of 80% or higher.

SECTION D – Direct Current (DC) Theory I – Pass all assignments and exams on direct current (DC) theory with a minimum score of 80% or higher.

SECTION E – Alternating Current (AC) Theory I – Pass all assignments and exams on alternating current (AC) theory with a minimum score of 80% or higher.

SECTION F – Capacitance I – Pass all assignments and exams on capacitance with a minimum score of 80% or higher.

SECTION G – Inductance I – Pass all assignments and exams on inductance with a minimum score of 80% or higher.

SECTION H – Employability Skills – Pass all assignments and exams on employability skills with a minimum score of 80% or higher.

## ***Standards for Career Ready Practice***

**1. Apply appropriate technical skills and academic knowledge.**

Career-ready individuals readily access and use the knowledge and skills acquired through experience and education. They make connections between abstract concepts with real-world applications and recognize the value of academic preparation for solving problems, communicating with others, calculating measures, and performing other work-related practices.

**2. Communicate clearly, effectively, and with reason.**

Career-ready individuals communicate thoughts, ideas, and action plans with clarity, using written, verbal, electronic, and/or visual methods. They are skilled at interacting with others: they are active listeners who speak clearly and with purpose, and they are comfortable with terminology that is common to workplace environments. Career-ready individuals consider the audience for their communication and prepare accordingly to ensure the desired outcome.

**3. Develop an education and career plan aligned with personal goals.**

Career-ready individuals take personal ownership of their educational and career goals and manage their individual plan to attain these goals. They recognize the value of each step in the educational and experiential process, and they understand that nearly all career paths require ongoing education and experience to adapt to practices, procedures, and expectations of an ever-changing work environment. They seek counselors, mentors, and other experts to assist in the planning and execution of education and career plans.

**4. Apply technology to enhance productivity.**

Career-ready individuals find and maximize the productive value of existing and new technology to accomplish workplace tasks and solve workplace problems. They are flexible and adaptive in acquiring and using new technology. They understand the inherent risks—personal and organizational—of technology applications, and they take actions to prevent or mitigate these risks.

**5. Utilize critical thinking to make sense of problems and persevere in solving them**

Career-ready individuals recognize problems in the workplace, understand the nature of the problems, and devise effective plans to solve the problems. They thoughtfully investigate the root cause of a problem prior to introducing solutions. They carefully consider options to solve a problem and, once agreed upon, follow through to ensure the problem is resolved.

**6. Practice personal health and understand financial literacy.**

Career-ready individuals understand the relationship between personal health and workplace performance. They contribute to their personal well-being through a healthy diet, regular exercise, and mental health activities. Career-ready individuals also understand that financial literacy leads to a secure future that enables career success.

**7. Act as a responsible citizen in the workplace and the community.**

Career-ready individuals understand the obligations and responsibilities of being a member of a community and demonstrate this understanding every day through their interactions with others. They are aware of the impacts of their decisions on others and the environment around them, and they think about the short-term and long-term consequences of their actions. They are reliable and consistent in going beyond minimum expectations and in participating in activities that serve the greater good.

**8. Model integrity, ethical leadership, and effective management.**

Career-ready individuals consistently act in ways that align with personal and community-held ideals and principles. They employ ethical behaviors and actions that positively influence others. They have a clear understanding of integrity and act on this understanding in every decision. They use a variety of means to positively impact the direction and actions of a team or organization, and they recognize the short-term and long-term effects that management's actions and attitudes can have on productivity, morale, and organizational culture.



**9. Work productively in teams while integrating cultural and global competence.**

Career-ready individuals contribute positively to every team, as both team leaders and team members. To avoid barriers to productive and positive interaction, they apply an awareness of cultural differences. They interact effectively and sensitively with all members of the team and find ways to increase the engagement and contribution of other members.

**10. Demonstrate creativity and innovation.**

Career-ready individuals recommend ideas that solve problems in new and different ways and contribute to the improvement of the organization. They consider unconventional ideas and suggestions by others as solutions to issues, tasks, or problems. They discern which ideas and suggestions may have the greatest value. They seek new methods, practices, and ideas from a variety of sources and apply those ideas to their own workplace practices.

**11. Employ valid and reliable research strategies.**

Career-ready individuals employ research practices to plan and carry out investigations, create solutions, and keep abreast of the most current findings related to workplace environments and practices. They use a reliable research process to search for new information and confirm the validity of sources when considering the use and adoption of external information or practices.

**12. Understand the environmental, societal, and economic impacts of decisions.**

Career-ready individuals understand the interrelated nature of their actions and regularly make decisions that positively impact other people, organizations, the workplace, and the environment. They are aware of and utilize new technologies, understandings, procedures, and materials and adhere to regulations affecting the nature of their work. They are cognizant of impacts on the social condition, environment, workplace, and profitability of the organization.

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### Statement for Civil Rights

All educational and vocational opportunities are offered without regard to race, color, national origin, gender, or physical disability.

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