

Course Outline

Energy, Environment, and Utilities

REVISED: August/2020

Job Title

Electronics Technician

72-55-70

Career Pathway:

Telecommunications

Electronics/3

Industry Sector:

Energy, Environment, and Utilities

Credits: 15

Hours: 180

O*NET-SOC CODE:

17-3023.01

Course Description:

This competency-based course is the last in a sequence of three designed for electronics. It provides students with project-based experiences in electromechanical installation and maintenance. Instruction includes an introduction, reviews of trade mathematics, resource management, and employability skills, and an introduction to entrepreneurship. Emphasis is placed on operational amplifiers, oscillator and pulse control circuits, modulation and demodulation of analog circuitry, and the principles and uses of digital circuitry, mixed signal integrated circuitry (IC), telephone and wired systems, and local area networks (LAN). 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:

Introduction to Electronics Technology

Prerequisites:

Enrollment requires successful completion of the Electronics/2 (72-55-60) course.

CBEDS No.:

5551

NOTE: For Perkins purposes this course has been designated as a **capstone** 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. 7-14

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)

COURSE OUTLINE COMPONENTS	LOCATION
INSTRUCTIONAL STRATEGIES	p. 16
<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>	
UNITS OF STUDY, WITH APPROXIMATE HOURS ALLOTTED FOR EACH UNIT	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>	
EVALUATION PROCEDURES	pp. 16-17
<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>	
REPETITION POLICY THAT PREVENTS PERPETUATION OF STUDENT ENROLLMENT	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

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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

C. Telecommunications Pathway

The Telecommunications pathway prepares students for employment and postsecondary education and training in the wireless and fixed-line communications industries. The sharing of information is essential for personal, commercial, educational, government, and military functions. Information is stored, sent, and accessed primarily via the telecommunications industries.

Sample occupations associated with this pathway:

- ◆ Cable/Telecommunications Installation and Maintenance Technicians
- ◆ Line Workers
- ◆ Network Operators, Technicians, Designers, and Managers
- ◆ Network Security Administrator
- ◆ Satellite Systems Installation/Engineers

- C1.0 Understand the basic principles and concepts that impact the telecommunications industry, including systems, concepts, and regulations.
- C2.0 Demonstrate understanding and use of the basic and emerging technologies that impact the telecommunications industry.
- C3.0 Examine the role and functions of satellites in telecommunications.
- C4.0 Research the components, interaction, and operations of wireless telecommunications systems.
- C5.0 Research the components, interaction, and operations of fixed-wire telecommunications systems.
- C6.0 Consider privacy and security issues of the telecommunications systems.

CBE
Competency-Based Education

COMPETENCY-BASED COMPONENTS
for the Electronics/3 Course

COMPETENCY AREAS AND STATEMENTS	MINIMAL COMPETENCIES	STANDARDS
<p>A. INTRODUCTION AND SAFETY</p> <p>Review, apply, and evaluate classroom and workplace policies and procedures used in accordance with federal, state, and local safety and environmental regulations.</p> <p>(4 hours)</p>	<ol style="list-style-type: none"> 1. Review the scope and purpose of the course. 2. Review the overall course content as a part of the Linked Learning Initiative. 3. Review classroom policies and procedures. 4. Review the different occupations in the Energy and Utilities Industry Sector which have an impact on the role of electronics technicians. 5. Review the opportunities available for promoting gender equity and the representation of non-traditional populations in electronics. 6. Review the impact of Environmental Protection Agency (EPA) legislation on the Energy and Utilities Industry Sector practices. 7. Review and demonstrate the procedures for contacting proper authorities for the removal of hazardous materials based on the EPA standards. 8. Review the purpose of the California Occupational Safety and Health Administration (Cal/OSHA) and its laws governing electronics technicians. 9. Review and demonstrate the use of the Material Safety Data Sheet (MSDS) as it applies to the electronics industry. 10. Review classroom and workplace first aid and emergency procedures according to American Red Cross (ARC) standards. 11. Review how each of the following insures a safe workplace: <ol style="list-style-type: none"> a. employees' rights as they apply to job safety b. employers' obligations as they apply to safety c. safety laws applying to electrical tools 12. Pass the safety test with 100% accuracy. 	<p>Career Ready Practice: 1, 2, 3, 5, 7, 12</p> <p>CTE Anchor: Communications: 2.1, 2.2, 2.3 Career Planning and Management: 3.5 Problem Solving and Critical Thinking: 5.1, 5.2, 5.3, 5.4 Health and Safety: 6.1, 6.2, 6.4, 6.5, 6.6, 6.7, 6.8, 6.9, 6.12, 6.13, 6.14, 6.16 Leadership and Teamwork: 9.6 Technical Knowledge and Skills: 10.1, 10.2</p> <p>CTE Pathway: C1.1, C6.4,</p>
<p>B. RESOURCE MANAGEMENT REVIEW</p> <p>Review, apply, and evaluate resource management principles and techniques in the electronics business.</p>	<ol style="list-style-type: none"> 1. Review the definitions of the following: <ol style="list-style-type: none"> a. resources b. management c. sustainability 2. Review the management of the following resources in the electronics business: <ol style="list-style-type: none"> a. time b. materials c. personnel 	<p>Career Ready Practice: 1, 2, 3, 5, 7, 9</p> <p>CTE Anchor: Communications: 2.1, 2.2, 2.3, 2.4 Career Planning and Management: 3.2</p>

COMPETENCY AREAS AND STATEMENTS	MINIMAL COMPETENCIES	STANDARDS
(1 hour)	<ol style="list-style-type: none"> 3. Review specific examples of effective management of the following in the electronics business: <ol style="list-style-type: none"> a. time b. materials c. personnel 4. Review the benefits of effective resource management in the electronics business: <ol style="list-style-type: none"> a. profitability b. sustainability c. company growth 5. Review the economic benefits and liabilities of managing resources in an environmentally responsible way. 	<p>Critical Thinking: 5.1, 5.2, 5.3, 5.4 Responsibility and Flexibility: 7.1, 7.2, 7.3, 7.4, 7.6 Ethics and Legal Responsibilities: 8.1, 8.3, 8.4, 8.5 Leadership and Teamwork: 9.1, 9.2</p> <p>CTE Pathway: C1.1</p>
<p>C. TRADE MATHEMATICS REVIEW</p> <p>Review, apply, and evaluate the mathematical requirements in electronics work.</p>	<ol style="list-style-type: none"> 1. Review the practical applications of math in electronics work. 2. Review and demonstrate problem-solving techniques involving whole number problems, using arithmetic operations (addition, subtraction, multiplication, and division). 3. Review and demonstrate problem-solving techniques involving various fraction problems using arithmetic operations. 4. Review and demonstrate problem-solving techniques involving various decimal problems using addition, subtraction, multiplication, and division. 5. Review and demonstrate techniques for changing fractions to decimals. 6. Review and demonstrate techniques for changing decimals to fractions. 7. Review the English system of measuring length. 8. Review the English system of measuring weight. 9. Review the English system of measuring volume or capacity. 10. Review and demonstrate problem-solving techniques for various English system measuring problems using arithmetic operations. 11. Review and demonstrate measuring techniques for objects by using the English system measuring tools common to the trade. 12. Review the conversion of metric units in ascending and descending powers of ten. 13. Review the conversion of the English numbering system to metric system. 14. Review the conversion of the metric system to the English numbering system. 15. Review the calculation of square roots of regular numbers. 16. Review and demonstrate problem-solving techniques for geometric problems. 17. Review and demonstrate problem-solving techniques for algebraic problems. 	<p>Career Ready Practice: 1, 2, 5</p> <p>CTE Anchor: Communications: 2.1, 2.3, Problem Solving and Critical Thinking: 5.1, 5.4 Technical Knowledge and Skills: 10.1</p> <p>CTE Pathway: C1.5</p>

COMPETENCY AREAS AND STATEMENTS	MINIMAL COMPETENCIES	STANDARDS
(15 hour)	18. Review and demonstrate problem-solving techniques using percentages. 19. Review and demonstrate techniques for reading and interpreting graphs. 20. Review and demonstrate the conversion of decimal numbers to binary numbers. 21. Review and demonstrate the conversion of binary numbers to decimal numbers.	
D. ANALOG CIRCUITRY: OPERATIONAL AMPLIFIERS (OP-AMPS) Understand, apply, and evaluate the techniques for using operational amplifier circuits. (25 hours)	1. Identify and describe the features and functions of the following: <ol style="list-style-type: none"> amplifier differential amplifier operational amplifier comparator circuit simple inverting amplifier non-inverting amplifiers voltage follower low-pass active filters high-pass active filters band-pass active filters 2. Define the following: <ol style="list-style-type: none"> resistance output impedance gain bandwidth product offset rate slew rate 3. Describe the operating characteristics of a differential amplifier. 4. Identify the schematic diagram and symbols of operational amplifiers. 5. Describe the operating characteristics of various types of operational amplifiers. 6. Describe and demonstrate the following: <ol style="list-style-type: none"> operation of a comparator circuit design simple inverting and non-inverting amplifiers using operational amplifiers identify the schematic diagram for summing and difference amplifiers operation of summing and difference amplifiers operation of the low-pass, high-pass, and band-pass active filters troubleshooting techniques for operational amplifier circuits using schematic diagrams as a guide 	Career Ready Practice: 1, 2, 3, 11 CTE Anchor: Communications: 2.1, 2.2, 2.3, 2.4 Problem Solving and Critical Thinking: 5.1, 5.3, 5.4 Health and Safety: 6.6, 6.15, 6.16 Technical Knowledge and Skills: 10.1, 10.2 CTE Pathway: C1.1, C1.4, C5.5, C5.7

COMPETENCY AREAS AND STATEMENTS	MINIMAL COMPETENCIES	STANDARDS
<p>E. ANALOG CIRCUITRY: OSCILLATOR AND PULSE CONTROL CIRCUITS</p> <p>Understand, apply, and evaluate the operational techniques for using various oscillator and pulse control circuits.</p> <p>(25 hours)</p>	<ol style="list-style-type: none"> 1. Identify and describe the features and functions of the following: <ol style="list-style-type: none"> a. oscillation b. oscillator c. pulse control circuits d. frequency synthesizer e. phase locked loop (PLL) circuits 2. Define the following: <ol style="list-style-type: none"> a. time-domain analysis b. frequency domain analysis 3. Describe and demonstrate the following: <ol style="list-style-type: none"> a. illustration of a block diagram of a basic frequency synthesizer b. methods of synthesizing frequencies 4. Differentiate between periodic and non- periodic waveforms. 5. Review the sine wave components contained in a square wave, saw-tooth, and triangle waveforms. 6. Describe and demonstrate how a "555 timer" can be connected as a stable or mono-stable multi-vibrator. 7. Describe and demonstrate troubleshooting techniques for electronic oscillator and pulse control circuits using schematic diagrams and test equipment. 	<p>Career Ready Practice: 1, 2, 5, 11</p> <p>CTE Anchor: Communications: 2.1, 2.2, 2.3, 2.4 Problem Solving and Critical Thinking: 5.1, 5.2, 5.3, 5.4 Health and Safety: 6.6, 6.15, 6.16 Technical Knowledge and Skills: 10.1, 10.2</p> <p>CTE Pathway: C1.1, C1.4, C5.5, C5.7</p>
<p>F. ANALOG CIRCUITRY: MODULATION</p> <p>Understand, apply, and evaluate the basic principles and uses of modulation and demodulation.</p>	<ol style="list-style-type: none"> 1. Define the following: <ol style="list-style-type: none"> a. analog circuitry b. modulation c. demodulation d. amplitude modulation (AM) e. frequency modulation (FM) f. frequency deviation g. sensitivity h. selectivity i. single sideband (SSB) j. transmitters k. receivers 2. Describe the characteristics of amplitude modulation (AM), single sideband (SSB), and frequency modulation (FM), including advantages and disadvantages of each. 3. Describe the heterodyne principle. 4. Describe and demonstrate the following: <ol style="list-style-type: none"> a. drawing block diagrams of basic AM, SSB, and FM transmitters and receivers b. identifying circuit configurations (type of modulation being used) from a schematic diagram c. drawing examples of AM modulation envelopes illustrating over-modulation and 100% modulation d. determining the percentage of total power that is contained in single sideband e. determining the frequency range and frequencies used in standard AM and FM commercial broadcast bands 	<p>Career Ready Practice: 1, 2, 5, 11</p> <p>CTE Anchor: Communications: 2.1, 2.2, 2.3, 2.4 Problem Solving and Critical Thinking: 5.1, 5.2, 5.3, 5.4 Health and Safety: 6.6, 6.15, 6.16 Technical Knowledge and Skills: 10.1, 10.2</p> <p>CTE Pathway: C1.1, C1.4, C5.5, C5.7</p>

COMPETENCY AREAS AND STATEMENTS	MINIMAL COMPETENCIES	STANDARDS
(25 hours)	<ul style="list-style-type: none"> f. constructing basic modulation and demodulation circuits g. illustrating the half-split method in troubleshooting circuits h. troubleshooting techniques for basic modulation and demodulation circuits, using block and schematic diagrams 	
<p>G. DIGITAL CIRCUITRY</p> <p>Understand, apply, and evaluate the principles and uses of digital circuitry.</p> <p>(35 hours)</p>	<ul style="list-style-type: none"> 1. Define the following: <ul style="list-style-type: none"> a. digital circuitry b. digital electronics c. Boolean algebra d. logic elements e. logic circuits f. logic gates g. logic gates families h. flip-flop i. sequential circuits 2. Identify the following: <ul style="list-style-type: none"> a. symbols in digital electronic circuitry b. number systems used in digital electronics c. examples of electronic equipment using digital techniques d. components used in implementing digital circuits e. types of semiconductor elements used in digital circuits f. basic types of logic elements g. commonly used integrated circuit families used in digital equipment 3. Describe the following: <ul style="list-style-type: none"> a. advantages of digital techniques over analog b. operation of digital logic gates c. operation of commonly used integrated circuit families used in digital equipment d. characteristics of commonly used integrated circuit families used in digital equipment 4. Describe and demonstrate the following: <ul style="list-style-type: none"> a. application of Boolean algebra to express logic operations b. application of Boolean algebra to minimize logic circuits in design c. operation of flip-flop d. operation of various sequential circuits such as counter and shift register e. application of various sequential circuits such as counter and shift register f. construction of combinational logic circuits 	<p>Career Ready Practice: 1, 2, 5, 11</p> <p>CTE Anchor: Communications: 2.1, 2.2, 2.3, 2.4 Problem Solving and Critical Thinking: 5.1, 5.2, 5.3, 5.4 Health and Safety: 6.6, 6.15, 6.16 Technical Knowledge and Skills: 10.1, 10.2</p> <p>CTE Pathway: C1.4, C1.5, C2.1, C5.7</p>
<p>H. MIXED-SIGNAL INTEGRATED CIRCUITRY (IC)</p> <p>Understand, apply, and evaluate the principles and uses of mixed-signal IC.</p>	<ul style="list-style-type: none"> 1. Define mixed-signal circuitry. 2. Identify the following: <ul style="list-style-type: none"> a. modulator b. data converter c. cellular telephone d. software radio 	<p>Career Ready Practice: 1, 2, 5, 11</p>

COMPETENCY AREAS AND STATEMENTS	MINIMAL COMPETENCIES	STANDARDS
(20 hours)	<ul style="list-style-type: none"> e. Local Area Network Integrated Circuit (LAN IC) f. Wide Area Network Router Integrated Circuit (WAN router IC) <ol style="list-style-type: none"> 3. Describe the mixed-signal ICs in the following: <ul style="list-style-type: none"> a. data converter b. cellular telephone c. software radio d. Local Area Network Integrated Circuit (LAN IC) e. Wide Area Network Router Integrated Circuit (WAN router IC) 4. Describe the challenges of mixed signals. 5. Describe and demonstrate how an audio-video signal can be modulated, amplified, and distributed to a multi-room configuration. 	<p>CTE Anchor: Communications: 2.1, 2.2, 2.3, 2.4 Problem Solving and Critical Thinking: 5.1, 5.2, 5.3, 5.4 Health and Safety: 6.6, 6.15, 6.16 Technical Knowledge and Skills: 10.1, 10.2</p> <p>CTE Pathway: C1.1, C1.5, C2.2, C2.4, C2.6, C4.1, C4.2, C4.3, C4.4, C4.8, C5.3, C6.1</p>
<p>I. TELEPHONE AND WIRED SYSTEMS</p> <p>Understand, apply, and evaluate the basic principles and uses of telephone network cabling.</p> <p>(20 hours)</p>	<ol style="list-style-type: none"> 1. Define the following: <ul style="list-style-type: none"> a. signal/reception b. single zone c. dead zone d. twisted pair e. coaxial cabling f. fiber optic cabling 2. Identify various signals and messages used to operate local telephone services. 3. Describe the advantages and disadvantages of each LAN transmission media. 4. Identify the bandwidth for the following: <ul style="list-style-type: none"> a. twisted pair b. coaxial cabling c. fiber optic cabling 5. Identify the transmission distance of each cabling technique. 6. Describe and demonstrate the following: <ul style="list-style-type: none"> a. wiring an extension phone b. testing a phone circuit c. connecting LANs d. troubleshooting cabling problems e. increasing cabling distance 	<p>Career Ready Practice: 1, 2, 3, 4, 5, 10, 11</p> <p>CTE Anchor: Communications: 2.1, 2.2, 2.3 Problem Solving and Critical Thinking: 5.1, 5.2 Technical Knowledge and Skills: 10.1, 10.3, 10.5</p> <p>CTE Pathway: C1.1, C1.3, C1.4, C1.7, C1.8, C2.2, C2.3, C2.4, C5.4, C5.5, C5.7, C5.8, C5.11</p>

COMPETENCY AREAS AND STATEMENTS	MINIMAL COMPETENCIES	STANDARDS
<p>J. EMPLOYABILITY SKILLS REVIEW</p> <p>Review, apply, and evaluate the employability skills required in electronics work.</p> <p>(5 hours)</p>	<ol style="list-style-type: none"> 1. Review employer requirements for the following: <ol style="list-style-type: none"> a. punctuality b. attendance c. attitude toward work d. quality of work e. teamwork f. timeliness g. communication skills h. computer skills and software applications 2. Update list of potential employers through traditional and internet sources. 3. Review the role of electronic social networking in job search. 4. Update sample résumés. 5. Review the importance of filling out a job application legibly, with accurate and complete information. 6. Review the common mistakes that are made on job applications. 7. Complete sample job application forms correctly. 8. Review the importance of enthusiasm in the interview and on a job. 9. Review the importance of appropriate appearance in the interview and on a job. 10. Review the importance of the continuous upgrading of job skills. 11. Review the importance of customer service as a method of building permanent relationships between the organization and the customer. 12. Review and demonstrate appropriate interviewing techniques. 13. Review the informational materials and resources needed to be successful in an interview. 14. Review and demonstrate appropriate follow-up procedures. 	<p>Career Ready Practice: 1, 2, 3, 5,7</p> <p>CTE Anchor: Communications: 2.1, 2.3, 2.4 Career Planning and Management: 3.1, 3.3, 3.4 Responsibility and Flexibility: 7.4, 7.7 Ethics and Legal Responsibilities: 8.4 Leadership and Teamwork: 9.4 Demonstration and Application: 11.1, 11.5</p> <p>CTE Pathway: C1.1, C1.2, C2.9, C6.4, C7.1, C7.4</p>
<p>K. ENTREPRENEURIAL SKILLS</p> <p>Understand, apply, and evaluate the process involved in becoming an entrepreneur in the mobile electronics industry.</p>	<ol style="list-style-type: none"> 1. Define entrepreneurship. 2. Identify the necessary characteristics of successful entrepreneurs. 3. Discuss the contributions of entrepreneurs to the electronics industry. 4. Explain the purpose and components of a business plan. 5. Examine personal goals prior to starting a business. 6. Evaluate sources of monetary investment in a business opportunity. 7. Discuss various licensing requirements in the electronics business. 8. Develop a scenario depicting the student as the electronics business owner. 9. Differentiate between LEED business practices and standard business practices. 	<p>Career Ready Practice: 2, 3, 5, 6, 7, 8, 12</p> <p>CTE Anchor: Communications: 2.2, 2.3, 2.4, 2.5 Career Planning and Management: 3.2, 3.3, 3.4, 3.6, 3.7, 3.9 Technology: 4.1, 4.2 Problem Solving and Critical Thinking: 5.1, 5.2, 5.3, 5.4</p>

COMPETENCY AREAS AND STATEMENTS	MINIMAL COMPETENCIES	STANDARDS
(5 hours)		Responsibility and Flexibility: 7.1, 7.2, 7.4, 7.6, 7.7, 7.8 Ethics and Legal Responsibilities: 8.4, 8.5 Leadership and Teamwork: 9.1, 9.2, 9.4 Technical Knowledge and Skills: 10.1, 10.2, 10.4 Demonstration and Application: 11.5 CTE Pathway: C1.1, C6.4, C7.1, C7.2, C7.3, C7.4, C7.5, C7.6

SUGGESTED INSTRUCTIONAL MATERIALS and OTHER RESOURCES

TEXTS AND SUPPLEMENTAL BOOKS

Bishop, Owen. Electronics: Circuits and Systems, 3rd Edition. Elsevier Science and Technology, 2007.

Grob, Bernard and Mitchell E. Schultz. Basic Electronics, 5th Edition. McGraw-Hill Companies, 2002.

Herrick, Clyde. Basic Electronics Math. Elsevier Science, 2007.

Schuler, Charles A. Electronics: Principles and Applications, 6th Edition. McGraw-Hill and Companies, 2002.

RESOURCES

Employer Advisory Board members

CTE Model Curriculum Standards

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

California Building Standards Commission

www.bsc.ca.gov/default.htm

Green Building Advisor.com

greenbuildingadvisor.com

The Daily Green

thedailygreen.com

COMPETENCY CHECKLIST

TEACHING STRATEGIES and EVALUATION

METHODS AND PROCEDURES

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

EVALUATION

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

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

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

SECTION D – Analog Circuitry: Operational Amplifiers (OP-AMPS) – Pass all assignments and exams on analog circuitry: operational amplifiers (OP-AMPS) with a minimum score of 80% or higher.

SECTION E – Analog Circuitry: Oscillator and Pulse Control Circuits – Pass all assignments and exams on analog circuitry: oscillator and pulse control circuits with a minimum score of 80% or higher.

SECTION F – Analog Circuitry: Modulation – Pass all assignments and exams on analog circuitry: modulation with a minimum score of 80% or higher.

SECTION G – Digital Circuitry – Pass all assignments and exams on digital circuitry with a minimum score of 80% or higher.

SECTION H – Mixed-Signal Integrated Circuitry (IC) – Pass all assignments and exams on mixed-signal integrated circuitry (IC) with a minimum score of 80% or higher.

SECTION I – Telephone and Wired Systems – Pass all assignments and exams on telephone and wired systems with a minimum score of 80% or higher.

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

SECTION K – Entrepreneurial Skills – Pass all assignments and exams on entrepreneurial 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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