

# Course Outline

Energy, Environment, and Utilities

REVISED: August/2017

**Job Title:**

Electronics Technician

**79-35-90**

**Career Pathway:**

Telecommunications

**Mobile Electronics Technician/3**

**Industry Sector:**

Energy, Environment, and Utilities

**Credits:** 15

**Hours:** 180

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

17-3023.01

**Course Description:**

This competency-based course provides instruction and experience in hands-on installation methods for mobile electronics. Instruction includes information on vehicle security systems, cellular phones, navigation equipment, and vehicle tracking systems. It also reviews career opportunities and business management skills necessary in the mobile electronics trade. 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 Mobile Electronics Technician/2 (79-35-85) 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**

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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**

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Instructional techniques or methods could include laboratory techniques, lecture method, small-group discussion, grouping plans, and other strategies used in the classroom.

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.

**UNITS OF STUDY, WITH APPROXIMATE HOURS ALLOTTED FOR EACH UNIT**

Cover

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.

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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.

**EVALUATION PROCEDURES**

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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.

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.

**REPETITION POLICY THAT PREVENTS PERPETUATION OF STUDENT ENROLLMENT**

Cover

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.

## **ACKNOWLEDGMENTS**

Thanks to PAUL PIDOUX and MARCELA BAKER 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***

### **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 Mobile Electronics Technician/3 Course**

| COMPETENCY AREAS AND STATEMENTS   | MINIMAL COMPETENCIES   | STANDARDS   |
|---|--|---|
| <p>A. ORIENTATION</p> <p>Understand the philosophy and purpose of the class.</p> <p>(5 hours)</p> | <ol style="list-style-type: none"> <li>1. Describe class procedures.</li> <li>2. Describe class policies.</li> </ol>   | <p><b>Career Ready Practice:</b><br/>1</p> <p><b>CTE Anchor:</b><br/>Communications:<br/>2.1, 2.2, 2.3<br/>Career Planning and Management:<br/>3.1, 3.2, 3.4, 3.6</p> <p><b>CTE Pathway:</b><br/>C1.1</p>   |
| <p>B. SAFETY</p> <p>Comprehend safety test and procedures.</p> <p>(15 hours)</p>                  | <ol style="list-style-type: none"> <li>1. Describe safety and first aid procedures.</li> <li>2. Pass designated safety test with 100% accuracy.</li> <li>3. Demonstrate proper safety techniques for power tools.</li> <li>4. Demonstrate proper safety techniques for hand tools.</li> <li>5. Demonstrate proper safety techniques for equipment.</li> <li>6. Demonstrate care in handling of vehicles.</li> <li>7. Explain the danger of wet cell batteries.</li> <li>8. Demonstrate procedures for working in an engine compartment.</li> </ol> | <p><b>Career Ready Practice:</b><br/>1, 3, 6, 12</p> <p><b>CTE Anchor:</b><br/>Communications:<br/>2.1, 2.2, 2.3<br/>Health and Safety:<br/>6.1, 6.2, 6.3, 6.4, 6.5, 6.6, 6.7, 6.8, 6.9, 6.10, 6.11, 6.12, 6.13, 6.14, 6.15, 6.16<br/>Ethics and Legal Responsibilities:<br/>8.2<br/>Technical Knowledge and Skills:<br/>10.1, 10.2</p> <p><b>CTE Pathway:</b><br/>C1.1</p> |

| COMPETENCY AREAS AND STATEMENTS   | MINIMAL COMPETENCIES   | STANDARDS   |
|---|--|---|
| <p>C. TOOLS</p> <p>Demonstrate the proper use of tools.</p> <p>(10 hours)</p>   | <ol style="list-style-type: none"> <li>1. Identify various hand tools.</li> <li>2. Identify various power tools.</li> <li>3. Describe use of hand tools.</li> <li>4. Describe use of power tools.</li> <li>5. Describe student's responsibility for tools.</li> </ol>  | <p><b>Career Ready Practice:</b><br/>1</p> <p><b>CTE Anchor:</b><br/>Communications;<br/>2.1, 2.2, 2.3<br/>Health and Safety:<br/>6.3, 6.15, 6.16<br/>Technical Knowledge and Skills:<br/>10.1</p> <p><b>CTE Pathway:</b><br/>C5.7</p>  |
| <p>D. SECURITY SYSTEMS</p> <p>Understand the theory and installation of vehicle security systems.</p> <p>(90 hours)</p> | <ol style="list-style-type: none"> <li>1. Describe vehicle security equipment.</li> <li>2. Identify vehicle security equipment.</li> <li>3. Describe vehicle security installation techniques.</li> <li>4. Determine vehicle security needs.</li> <li>5. Design vehicle security system.</li> <li>6. Install vehicle security system.</li> <li>7. Describe vehicle security sensors.</li> <li>8. Install vehicle security sensors.</li> <li>9. Describe various options to vehicle security systems.</li> <li>10. Install various options to vehicle security systems.</li> <li>11. Check for proper installation of vehicle security systems.</li> <li>12. Check for proper operation of vehicle security systems.</li> <li>13. Demonstrate the use of vehicle security systems.</li> </ol> | <p><b>Career Ready Practice:</b><br/>1, 3, 4</p> <p><b>CTE Anchor:</b><br/>Communication:<br/>2.1, 2.2, 2.3, 2.4<br/>Problem Solving and Critical Thinking:<br/>5.1, 5.2, 5.4<br/>Health and Safety:<br/>6.6, 6.11, 6.13, 6.15, 6.16<br/>Responsibility and Flexibility:<br/>7.5<br/>Ethics and Legal Responsibilities:<br/>8.1, 8.2, 8.3, 8.4<br/>Knowledge and Skills:<br/>10.1, 10.2, 10.3, 10.5</p> <p><b>CTE Pathway:</b><br/>C1.1, C1.2, C4.3, C5.2, C5.3, C5.4, C5.5, C5.6, C5.7, C5.9, C6.1, C6.2, C6.4</p> |



| COMPETENCY AREAS AND STATEMENTS   | MINIMAL COMPETENCIES  | STANDARDS  |
|---|---|--|
| <p>E. CELLULAR PHONES</p> <p>Understand the use and installation of cellular phones.</p> <p>(20 hours)</p>                | <ol style="list-style-type: none"> <li>1. Describe cellular phone systems, including information such as theory, process, and basic principles.</li> <li>2. Describe various parts of a cellular phone system.</li> <li>3. Identify various parts of a cellular phone.</li> <li>4. Describe how to program a cellular phone.</li> <li>5. Describe proper locations for cellular phone installation.</li> <li>6. Describe and choose a location for a cellular phone.</li> <li>7. Describe the wiring of cellular phones.</li> <li>8. Identify various accessories for a cellular phone.</li> <li>9. Demonstrate the operation of a cellular phone.</li> </ol> | <p><b>Career Ready Practice:</b><br/>1, 3</p> <p><b>CTE Anchor:</b><br/>Communications:<br/>2.1, 2.2, 2.3, 2.6<br/>Responsibility and Flexibility:<br/>8.1, 8.2<br/>Technical Knowledge and Skills:<br/>10.1, 10.2</p> <p><b>CTE Pathway:</b><br/>C1.1, C1.2, C4.1, C4.2, C4.3, C4.8, C4.9, C6.4</p>                       |
| <p>F. NAVIGATION AND TRACKING SYSTEMS</p> <p>Understand the use of navigation and tracking systems.</p> <p>(10 hours)</p> | <ol style="list-style-type: none"> <li>1. Describe the theory and operation of various types of vehicle navigation systems.</li> <li>2. Describe skills necessary to install vehicle navigation systems.</li> <li>3. Describe the theory and operation of various types of vehicle tracking systems.</li> <li>4. Discuss skills necessary to install vehicle tracking systems.</li> </ol>   | <p><b>Career Ready Practice:</b><br/>1, 3, 4</p> <p><b>CTE Anchor:</b><br/>Communications:<br/>2.1, 2.2, 2.3<br/>Responsibility and Flexibility:<br/>7.5<br/>Ethics and Legal Responsibilities:<br/>8.4<br/>Technical Knowledge and Skills:<br/>10.1, 10.5</p> <p><b>CTE Pathway:</b><br/>C3.1, C3.3, C3.6, C7.2, C7.3</p> |

| COMPETENCY AREAS AND STATEMENTS   | MINIMAL COMPETENCIES   | STANDARDS  |
|---|--|--|
| <p>G. CUSTOMER RELATIONS</p> <p>Demonstrate proper customer relations.</p> <p>(15 hours)</p>                                | <ol style="list-style-type: none"> <li>1. Explain the operation of an audio system to a customer.</li> <li>2. Explain the operation of a security system to a customer.</li> <li>3. Explain the operation of a cellular phone to a customer.</li> <li>4. Specifically answer various customer questions.</li> <li>5. Check for proper function of all systems.</li> <li>6. Complete and sign check-out sheet to ensure proper operation of vehicle systems.</li> <li>7. Return vehicle to customer.</li> </ol> | <p><b>Career Ready Practice:</b><br/>1, 2, 3</p> <p><b>CTE Anchor:</b><br/>Communications:<br/>2.1, 2.2, 2.3, 2.4, 2.6<br/>Responsibility and Flexibility:<br/>7.2, 7.3, 7.4, 7.7<br/>Ethics and Legal Responsibilities:<br/>8.1, 8.3, 8.4, 8.5<br/>Technical Knowledge and Skills:<br/>10.1, 10.2</p> <p><b>CTE Pathway:</b><br/>C1.1, C1.2, C6.4, C7.1, C7.2, C7.3, C7.4, C7.5</p>                       |
| <p>H. EMPLOYABILITY SKILLS</p> <p>Understand the skills necessary to acquire, apply for, gain, and maintain employment.</p> | <ol style="list-style-type: none"> <li>1. Describe employment requirements.</li> <li>2. Know how to apply learned skills when seeking employment.</li> <li>3. Design a résumé.</li> <li>4. Complete a résumé.</li> <li>5. Describe job specifics for various positions.</li> <li>6. Describe qualifications needed for employment.</li> <li>7. Develop a plan for seeking employment.</li> <li>8. Identify potential employers.</li> </ol>   | <p><b>Career Ready Practice:</b><br/>1, 2, 3, 7, 8</p> <p><b>CTE Anchor:</b><br/>Communications:<br/>2.1, 2.2, 2.3, 2.4, 2.5<br/>Career Planning and Management:<br/>3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9<br/>Technology:<br/>4.4<br/>Responsibility and Flexibility:<br/>7.2, 7.4, 7.5, 7.6, 7.7<br/>Ethics and Legal Responsibilities:<br/>8.4<br/>Leadership and Teamwork:<br/>9.2, 9.4, 9.6</p> |

| COMPETENCY AREAS AND STATEMENTS | MINIMAL COMPETENCIES | STANDARDS  |
|---------------------------------|----------------------|--|
| (15 hours)                      |                      | Technical Knowledge and Skills:<br>10.1<br>Demonstration and Application:<br>11.1, 11.2, 11.5<br><br><b>CTE Pathway:</b><br>C1.1, C7.1, C7.2, C7.3, C7.4 |

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

### **TEXTS AND SUPPLEMENTAL BOOKS**

Agrawal Dharma P. and Qing-An Zeng. Introduction to Wireless and Mobile Systems. CL Engineering, 2010.

Fujimoto, Kyohei and J.R. James. Mobile Antenna Systems Handbook. Artech House, 2008.

Goldsmith, Andrea. Wireless Communications. Cambridge University Press, 2005.

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

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

Nicopolitidis, P. A.S. Pomportsis and M.S. Obaidat. Wireless Networks. Wiley, John and Sons, Incorporated, 2002.

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

Schwartz, Mischa. Mobile Wireless Communications. Cambridge University press, 2004.

Slone, G. Randy. Understanding Electricity and Electronics, 2<sup>nd</sup> 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>

Mobile Electronics Certified Professional (MECP) Program, 1919 S. Eads St., Arlington, VA 22202

866-858-1555

[www.mecp.com](http://www.mecp.com)

International Society of Certified Electronics Technicians, 3608 Pershing Ave., Forth Worth, TX, 76107-4527, 800-946-0201

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

Electronics Technicians Association International, 5 Depot Street, Greencastle, IN 46135, 800-288-3824

[www.eta-i.org](http://www.eta-i.org)

### **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 – Orientation – Pass all assignments and exams on orientation with a minimum score of 80% or higher.

SECTION B – Safety –Pass the safety test with 100% accuracy.

SECTION C – Tools – Pass all assignments and exams on tools with a minimum score of 80% or higher.

SECTION D – Security Systems – Pass all assignments and exams on security systems with a minimum score of 80% or higher.

SECTION E – Cellular Phones – Pass all assignments and exams on cellular phones with a minimum score of 80% or higher.

SECTION F – Navigation and Tracking Systems – Pass all assignments and exams on navigation and tracking systems with a minimum score of 80% or higher.

SECTION G – Customer Relations – Pass all assignments and exams on customer relations 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.

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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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