California CTE

Engineering and Architecture

Adopted 2013

Knowledge and Performance Anchor Standards

1 **Academics: Analyze and apply appropriate academic standards required for successful industry sector pathway completion leading to postsecondary education and employment. Refer to the Engineering and Architecture academic alignment matrix for identification of standards.** 1.0

2 **Communications: Acquire and accurately use Engineering and Architecture sector terminology and protocols at the career and college readiness level for communicating effectively in oral, written, and multimedia formats.** 2.0

1 Recognize the elements of communication using a sender–receiver model. 2.1

2 Identify barriers to accurate and appropriate communication. 2.2

3 Interpret verbal and nonverbal communications and respond appropriately. 2.3

4 Demonstrate elements of written and electronic communication, such as accurate spelling, grammar, and format. 2.4

5 Communicate information and ideas effectively to multiple audiences using a variety of media and formats. 2.5

6 Advocate and practice safe, legal, and responsible use of digital media information and communications technologies. 2.6

3 **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.** 3.0

1 Identify personal interests, aptitudes, information, and skills necessary for informed career decision making. 3.1

2 Evaluate personal character traits, such as trust, respect, and responsibility, and understand the impact they can have on career success. 3.2

3 Explore how information and communication technologies are used in career planning and decision making. 3.3

4 Research the scope of career opportunities available and the requirements for education, training, certification, and licensure. 3.4

5 Integrate changing employment trends, societal needs, and economic conditions into career planning. 3.5

6 Recognize the role and function of professional organizations, industry associations, and organized labor in a productive society. 3.6

7 Recognize the importance of small business in the California and global economies. 3.7

8 Understand how digital media are used by potential employers and postsecondary agencies to evaluate candidates. 3.8

9 Develop a career plan that reflects career interests, pathways, and postsecondary options. 3.9

4 **Technology: Use existing and emerging technology to investigate, research, and produce products and services, including new information, as required in the Engineering and Architecture sector workplace environment.** 4.0

1 Use electronic reference materials to gather information and produce products and services. 4.1

2 Employ Web-based communications responsibly and effectively to explore complex systems and issues. 4.2

3 Use information and communication technologies to synthesize, summarize, compare, and contrast information from multiple sources. 4.3

4 Discern the quality and value of information collected using digital technologies, and recognize bias and intent of the associated sources. 4.4

5 Research past, present, and projected technological advances as they impact a particular pathway. 4.5

6 Assess the value of various information and communication technologies to interact with constituent populations as part of a search of the current literature or in relation to the information task. 4.6

5 **Problem Solving and Critical Thinking: Conduct short, as well as more sustained, research projects to create alternative solutions to answer a question or solve a problem unique to the Engineering and Architecture sector using critical and creative thinking; logical reasoning, analysis, inquiry, and problem-solving techniques.** 5.0

1 Identify and ask significant questions that clarify various points of view to solve problems. 5.1

2 Solve predictable and unpredictable work-related problems using various types of reasoning (inductive, deductive) as appropriate. 5.2

3 Use systems thinking to analyze how various components interact with each other to produce outcomes in a complex work environment. 5.3

4 Interpret information and draw conclusions, based on the best analysis, to make informed decisions. 5.4

6 **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 Engineering and Architecture sector workplace environment.** 6.0

1 Locate, and adhere to, Material Safety Data Sheet (MSDS) instructions. 6.1

2 Interpret policies, procedures, and regulations for the workplace environment, including employer and employee responsibilities. 6.2

3 Use health and safety practices for storing, cleaning, and maintaining tools, equipment, and supplies. 6.3

4 Practice personal safety when lifting, bending, or moving equipment and supplies. 6.4

5 Demonstrate how to prevent and respond to work-related accidents or injuries; this includes demonstrating an understanding of ergonomics. 6.5

6 Maintain a safe and healthful working environment. 6.6

7 Be informed of laws/acts pertaining to the Occupational Safety and Health Administration (OSHA). 6.7

7 **Responsibility and Flexibility: Initiate, and participate in, a range of collaborations demonstrating behaviors that reflect personal and professional responsibility, flexibility, and respect in the Engineering and Architecture sector workplace environment and community settings.** 7.0

1 Recognize how financial management impacts the economy, workforce, and community. 7.1

2 Explain the importance of accountability and responsibility in fulfilling personal, community, and workplace roles. 7.2

3 Understand the need to adapt to changing and varied roles and responsibilities. 7.3

4 Practice time management and efficiency to fulfill responsibilities. 7.4

5 Apply high-quality techniques to product or presentation design and development. 7.5

6 Demonstrate knowledge and practice of responsible financial management. 7.6

7 Demonstrate the qualities and behaviors that constitute a positive and professional work demeanor, including appropriate attire for the profession. 7.7

8 Explore issues of global significance and document the impact on the Engineering and Architecture sector. 7.8

8 **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.** 8.0

1 Access, analyze, and implement quality assurance standards of practice. 8.1

2 Identify local, district, state, and federal regulatory agencies, entities, laws, and regulations related to the Engineering and Architecture industry sector. 8.2

3 Demonstrate ethical and legal practices consistent with Engineering and Architecture sector workplace standards. 8.3

4 Explain the importance of personal integrity, confidentiality, and ethical behavior in the workplace. 8.4

5 Analyze organizational culture and practices within the workplace environment. 8.5

6 Adhere to copyright and intellectual property laws and regulations, and use and appropriately cite proprietary information. 8.6

7 Conform to rules and regulations regarding sharing of confidential information, as determined by Engineering and Architecture sector laws and practices. 8.7

9 **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.** 9.0

1 Define leadership and identify the responsibilities, competencies, and behaviors of successful leaders. 9.1

2 Identify the characteristics of successful teams, including leadership, cooperation, collaboration, and effective decision-making skills, as applied in groups, teams, and career technical student organization activities. 9.2

3 Understand the characteristics and benefits of teamwork, leadership, and citizenship in the school, community, and workplace setting. 9.3

4 Explain how professional associations and organizations and associated leadership development and competitive career development activities enhance academic preparation, promote career choices, and contribute to employment opportunities. 9.4

5 Understand that the modern world is an international community and requires an expanded global view. 9.5

6 Respect individual and cultural differences and recognize the importance of diversity in the workplace. 9.6

7 Participate in interactive teamwork to solve real Engineering and Architecture sector issues and problems. 9.7

10 **Technical Knowledge and Skills: Apply essential technical knowledge and skills common to all pathways in the Engineering and Architecture sector, following procedures when carrying out experiments or performing technical tasks.** 10.0

1 Interpret and explain terminology and practices specific to the Engineering and Architecture sector. 10.1

2 Comply with the rules, regulations, and expectations of all aspects of the Engineering and Architecture sector. 10.2

3 Construct projects and products specific to the Engineering and Architecture sector requirements and expectations. 10.3

4 Collaborate with industry experts for specific technical knowledge and skills. 10.4

11 **Demonstration and Application: Demonstrate and apply the knowledge and skills contained in the Engineering and Architecture anchor standards, pathway standards, and performance indicators in classroom, laboratory and workplace settings, and through the SkillsUSA career technical student organization.** 11.0

1 Utilize work-based/workplace learning experiences to demonstrate and expand upon knowledge and skills gained during classroom instruction and laboratory practices specific to the Engineering and Architecture sector program of study. 11.1

2 Demonstrate proficiency in a career technical pathway that leads to certification, licensure, and/or continued learning at the postsecondary level. 11.2

3 Demonstrate entrepreneurship skills and knowledge of self-employment options and innovative ventures. 11.3

4 Employ entrepreneurial practices and behaviors appropriate to Engineering and Architecture sector opportunities. 11.4

5 Create a portfolio, or similar collection of work, that offers evidence through assessment and evaluation of skills and knowledge competency as contained in the anchor standards, pathway standards, and performance indicators. 11.5

Pathway Standards

A. Architectural Design Pathway

1. Understand how history shaped architecture and know significant events in the history of architectural design. A1.0
    1. Know significant historical architectural projects and their effects on society. A1.1
    2. Understand the development of architectural systems in relation to aesthetics, efficiency, and safety. A1.2
2. Compare the theoretical, practical, and contextual issues that influence design. A2.0
    1. Describe the influence of community context and zoning requirements on architectural design. A2.1
    2. Understand the ways in which sociocultural conditions and issues influence architectural design. A2.2
    3. Compare the theoretical and practical effects of human and physical factors on the development of architectural designs. A2.3
    4. Analyze project design and compile a cost analysis. A2.4
3. Understand the sketching processes used in concept development. A3.0
    1. Apply sketching techniques to a variety of architectural models. A3.1
    2. Produce proportional two- and three-dimensional sketches and designs. A3.2
    3. Present conceptual ideas, analysis, and design concepts using freehand graphic communication techniques. A3.3
4. Understand the use of computer-aided drafting (CAD) in developing architectural designs. A4.0
    1. Develop a preliminary architectural proposal using CAD software. A4.1
    2. Analyze viability of a project as the design is developed using Building Information Modeling (BIM). A4.2
5. Compare the relationship between architecture and the external environment. A5.0
    1. Understand the significance of sustainable building design practices that incorporate beneficial energy and environmental design policies. A5.1
    2. Develop a site analysis that considers passive energy techniques, sustainability issues, and landscaping. A5.2
    3. Create a building design that incorporates passive and/or active energy-efficient technologies. A5.3
6. Understand methods used to analyze simple structures. A6.0
    1. Understand load transfer mechanisms. A6.1
    2. Understand stress-strain relationships of building structures. A6.2
    3. Interpret structural design considerations, including load-bearing relationships of shear walls, columns, and beams. A6.3

4. Design a simple structure by using structural analysis principles. A6.4

7. Understand the properties of structural materials. A7.0
    1. Understand the integration of architectural factors, such as soil mechanics, foundation design, engineering materials, and structure design. A7.1
    2. Develop a stress analysis chart of typical structural components. A7.2
    3. Evaluate available building materials (e.g., steel, concrete, and wood) by considering their properties and their effect on building form. A7.3
    4. Develop a preliminary building plan using the appropriate materials. A7.4
8. Systematically complete an architectural project. A8.0
    1. Describe the various components of structures, including lighting; heating, ventilating, and air-conditioning (HVAC); mechanical; electrical; plumbing; communication; security; and vertical transportation systems. A8.1
    2. Develop a preliminary proposal for presentation of an architectural design. A8.2
    3. Read and interpret architectural and construction plans, drawings, diagrams, and specifications. A8.3
    4. Develop a complete set of architectural plans and drawings. A8.4
    5. Estimate the materials needed for a project by reading an architectural drawing. A8.5
    6. Plan a project using site and building restrictions imposed by various entities (e.g., Planning, Zoning, Building, and Home Owners Association [HOA]). A8.6
    7. Plan the sequence of events leading to an architectural project. A8.7
9. Using various methods create both written and digital portfolios to represent architectural renderings. A9.0
    1. Develop a binder or digital portfolio representative of completed work for presentation. A9.1
    2. Prepare an effective oral presentation of the portfolio content. A9.2

B. Engineering Technology Pathway

1. Communicate and interpret information clearly in industry-standard visual and written formats. B1.0
    1. Explain the classification and use of various components, symbols, abbreviations, and media common to technical drawings. B1.1
    2. Describe the current industry standards for illustration and layout. B1.2
    3. Draw flat layouts of a variety of objects by using the correct drafting tools, techniques, and media. B1.3
    4. Organize and complete an assembly drawing using information collected from detailed drawings. B1.4
    5. Create reports and data sheets for writing specifications. B1.5
2. Demonstrate the sketching process used in concept development. B2.0
    1. Understand the process of producing proportional two- and three-dimensional sketches and designs. B2.1
    2. Apply sketching techniques to a variety of architectural and engineering models. B2.2
    3. Present conceptual ideas, analysis, and design concepts using freehand graphic communication techniques. B2.3
3. Identify the fundamentals of the theory, measurement, control, and applications of electrical energy, including alternating and direct currents. B3.0
    1. Understand the characteristics of alternating current (AC) and how it is generated; the characteristics of the sine wave; and of AC, tuned, and resonant circuits; and the nature of the frequency spectrum. B3.1
    2. Analyze relationships between voltage, current, resistance, and power related to direct current (DC) circuits. B3.2
    3. Calculate, construct, measure, and interpret both AC and DC circuits. B3.3
    4. Understand how electrical control and protection devices are used in electrical systems. B3.4
    5. Calculate loads, currents, and circuit-operating parameters. B3.5
    6. Classify and use various electrical components, symbols, abbreviations, media, and standards of electrical drawings. B3.6
    7. Analyze, repair, or measure electrical and electronic systems, circuits, or components using appropriate electronic instruments. B3.7
    8. Predict the effects of circuit conditions on the basis of measurements and calculations of voltage, current, resistance, and power. B3.8
4. Understand the concepts of physics that are fundamental to engineering technology. B4.0
    1. Describe Newton's laws and how they affect and define the movement of objects. B4.1

2. Explain how the laws of conservation of energy and momentum provide a way to predict and describe the movement of objects. B4.2
3. Compare the effects and applications of heat transfer and thermal dynamic processes. B4.3
4. Explore the fundamentals and properties of waveforms and how waveforms may be used to carry energy. B4.4
5. Analyze how electric and magnetic phenomena are related and know common practical applications. B4.5

5. Understand how the principles of force, work, rate, power, energy, and resistance relate to mechanical, electrical, fluid, and thermal engineering systems. B5.0
    1. Differentiate between scalars and vectors. B5.1
    2. Solve problems by using the concept of vectoring to predict resultants. B5.2
    3. Compare and explore the six simple machines and their applications. B5.3
    4. Evaluate how energy is transferred and predict the effects of resistance in mechanical, electrical, fluid, and thermal systems. B5.4
    5. Formulate and solve problems by using the appropriate units applied in mechanical, electrical, fluid, and thermal engineering systems. B5.5
6. Employ the design process to solve analysis and design problems. B6.0
    1. Understand the steps in the design process. B6.1
    2. Determine what information and principles are relevant to a problem and its analysis. B6.2
    3. Choose between alternate solutions in solving a problem and be able to justify the choices made in determining a solution. B6.3
    4. Translate word problems into mathematical statements when appropriate. B6.4
    5. Demonstrate the process of developing multiple details, within design constraints, into a single solution. B6.5
    6. Construct a prototype from plans and test it. B6.6
    7. Evaluate and redesign a prototype on the basis of collected test data. B6.7
7. Understand industrial engineering processes, including the use of tools and equipment, methods of measurement, and quality assurance. B7.0
    1. Know the structure and processes of a quality assurance cycle. B7.1
    2. Describe the major manufacturing processes. B7.2
    3. Use tools, fasteners, and joining systems employed in selected engineering processes. B7.3
    4. Estimate and measure the size of objects in both Standard International and United States units. B7.4
    5. Apply appropriate geometric dimensioning and tolerancing (GD&T) practices. B7.5

6 Calibrate precision measurement tools and instruments to measure objects. B7.6

8 Understand fundamental control system design and develop systems that complete preprogrammed tasks. B8.0

1 Identify the elements and processes necessary to develop a controlled system that performs a task. B8.1

2 Demonstrate the use of sensors for data collection and process correction in controlled systems. B8.2

3 Perform tests, collect data, analyze relationships, and display data in a simulated or modeled system using appropriate tools and technology. B8.3

4 Program a computing device to control systems or process. B8.4

5 Use motors, solenoids, and similar devices as output mechanisms in controlled systems. B8.5

6 Assemble input, processing, and output devices to create controlled systems capable of accurately completing a preprogrammed task. B8.6

9 Understand the fundamentals of systems and market influences on products as they are developed and released to production. B9.0

1 Understand the process of product development. B9.1

2 Understand decision matrices and the use of graphic tools in illustrating the development of a product and the processes involved. B9.2

10 Design and construct a culminating project effectively using engineering technology. B10.0

1 Use methods and techniques for employing all engineering technology equipment appropriately. B10.1

2 Apply conventional engineering technology processes and procedures accurately, appropriately, and safely. B10.2

3 Apply the concepts of engineering technology to the tools, equipment, projects, and procedures of the Engineering Technology Pathway. B10.3

11 Understand the methods of creating both written and digital portfolios. B11.0

1 Develop a binder or digital portfolio representative of student work for presentation. B11.1

2 Give an effective oral presentation of a portfolio. B11.2

C. Engineering Design Pathway

1. Understand historical and current events related to engineering design and their effects on society. C1.0
    1. Know historical and current events that have relevance to engineering design. C1.1
    2. Interpret the development of graphic language in relation to engineering design. C1.2
2. Understand the effective use of engineering design equipment. C2.0
    1. Employ engineering design equipment using the appropriate methods and techniques. C2.1
    2. Apply conventional engineering design equipment procedures accurately, appropriately, and safely. C2.2
    3. Apply the concepts of engineering design to the tools, equipment, projects, and procedures of the Engineering Design Pathway. C2.3
3. Understand the sketching process used in concept development. C3.0
    1. Apply sketching techniques to a variety of architectural models. C3.1
    2. Produce proportional two- and three-dimensional sketches and designs. C3.2
    3. Present conceptual ideas, analysis, and design concepts using freehand, graphic, communication techniques. C3.3
4. Understand measurement systems as they apply to engineering design. C4.0
    1. Know how the various measurement systems are used in engineering drawings. C4.1
    2. Understand the degree of accuracy necessary for engineering design. C4.2
5. Use proper projection techniques to develop orthographic drawings. C5.0
    1. Understand the concepts and procedures necessary for producing drawings. C5.1
    2. Develop multiview drawings using the orthographic projection process. C5.2
    3. Understand the various techniques for viewing objects. C5.3
    4. Use the concepts of geometric construction in the development of design drawings. C5.4
    5. Apply pictorial drawings derived from orthographic multiview drawings and sketches. C5.5
6. Understand the applications and functions of sectional views. C6.0
    1. Understand the function of sectional views. C6.1
    2. Clarify hidden features of an object using a sectional view and appropriate cutting planes. C6.2
7. Understand the applications and functions of auxiliary views. C7.0
    1. Understand the function of auxiliary views. C7.1

2 Use auxiliary views to clarify the true shape and size of an object. C7.2

8 Understand and apply proper dimensioning standards to drawings. C8.0

1 Know a variety of drafting applications and understand the proper dimensioning standards for each. C8.1

2 Apply dimension to various objects and features. C8.2

9 Understand the tolerance relationships between mating parts. C9.0

1 Understand what constitutes mating parts in engineering design. C9.1

2 Interpret geometric tolerancing symbols in a drawing. C9.2

3 Use tolerancing in an engineering drawing. C9.3

10 Understand the methods of applying text to a drawing. C10.0

1 Describe the processes of lettering and/or text editing. C10.1

2 Implement standard methods of title block creation and use. C10.2

3 Develop drawings using notes and specifications. C10.3

4 Plan, prepare, and interpret drawings and models through traditional drafting or computer-aided design (CAD) techniques. C10.4

11 Understand the methods of creating both written and digital portfolios. C11.0

1 Develop a binder or digital portfolio representative of completed work for presentation. C11.1

2 Give an effective oral presentation of a portfolio. C11.2

D. Environmental Engineering Pathway

1. Communicate and interpret information clearly in industry-standard visual and written formats. D1.0
    1. Know the current industry standards for illustration and layout. D1.1
    2. Understand the classification and use of various electronic components, symbols, abbreviations, and media common to electronic drawings. D1.2
    3. Organize and complete site plans. D1.3
2. Understand the design process and how to solve analysis and design problems. D2.0
    1. Understand the steps in the design process. D2.1
    2. Determine what information and principles are relevant to a problem and its analysis. D2.2
    3. Choose between alternate solutions in solving a problem and be able to justify choices in determining a solution. D2.3
    4. Understand the process of developing multiple details into a single solution. D2.4
    5. Translate word problems into mathematical statements when appropriate. D2.5
    6. Build a prototype from plans and test it. D2.6
    7. Evaluate and redesign a prototype on the basis of collected test data. D2.7
3. Understand the fundamentals of earth science as they relate to environmental engineering. D3.0
    1. Know the fundamental stages of geochemical cycles. D3.1
    2. Understand the effects of pollution on hydrological features. D3.2
    3. Classify the three major groups of rocks, according to their origin, on the basis of texture and mineral composition. D3.3
    4. Analyze the importance and use of soil and evaluate how soil may be preserved and conserved. D3.4
    5. Assess and evaluate geological hazards. D3.5
    6. Interpret and evaluate topographical maps and images. D3.6
    7. Locate and evaluate soil or geological conditions or features using global positioning systems equipment and related technology. D3.7
    8. Analyze soil erosion and identify the causes. D3.8
4. Understand the effects of the weather, the hydrosphere, and the atmosphere on the environment. D4.0
    1. Know the common causes of atmospheric contamination. D4.1
    2. Understand the effects of weather fronts on regional air pollution. D4.2

3 Understand the relationship between the health of the marine environment and climate control. D4.3

4 Understand the effects of human activity on the atmospheric environment. D4.4

5 Analyze and predict conditions of meteorological events. D4.5

6 Analyze the mechanisms for air mass movement. D4.6

7 Analyze atmospheric pressure and weather systems. D4.7

5 Understand how the principles of force, work, rate, power, energy, and resistance relate to mechanical, electrical, fluid, and thermal engineering systems. D5.0

1 Know the six simple machines and their applications. D5.1

2 Know how energy is transferred and the effects of resistance in mechanical, electrical, fluid, and thermal systems. D5.2

3 Understand scalars and vect D5.3

4 Solve problems by using the concept of vectoring to predict the resultant forces. D5.4

5 Solve problems by using the appropriate units applied in mechanical, electrical, fluid, and thermal engineering systems. D5.5

6 Evaluate regional interactive systems and elements that create harmful environmental effects. D6.0

1 Describe the sources of, and impacts attributable to, pollution and contamination. D6.1

2 Recognize the actions that cause resource depletion. D6.2

3 Define the causes of erosion and soil depletion. D6.3

4 Describe the attributes and proliferation of hardscape. D6.4

5 Identify the sources of, and impacts attributable to, habitat alteration. D6.5

7 Understand the concepts of physics that are fundamental to engineering technology. D7.0

1 Understand Newton's laws and how they affect and define the movement of objects. D7.1

2 Understand how the laws of conservation of energy and momentum provide a way to predict and describe the movement of objects. D7.2

3 Understand how electric and magnetic phenomena are related and know common practical applications. D7.3

4 Analyze the fundamentals and properties of waveforms and how waveforms may be used to carry energy. D7.4

8 Understand the effective use of environmental and natural science equipment. D8.0

1 Use appropriate methods and techniques for employing environmental and natural science equipment. D8.1

2. Apply conventional environmental and natural science processes and procedures accurately, appropriately, and safely. D8.2
3. Apply the concepts of environmental and natural science to the tools, equipment, projects, and procedures of the Environmental Engineering Pathway. D8.3

9. Identify the role and impact of waste management systems, and their operations, on the environment. D9.0
    1. Understand the role of waste and storm water management systems, their operation, and their impact on the environment. D9.1
    2. Explore the causes and effects of pollution linked to wastewater treatment facilities. D9.2
    3. Identify wastewater treatment processes that lessen environmental impacts and improve water reuse. D9.3
    4. Explain the types and sources of hazardous waste and associated safety practices and legal requirements for handling and disposing of such waste. D9.4
    5. Design solid waste disposal processes that lessen environmental impacts and improve recycling. D9.5
10. Understand the field of land use management and its potential for environmental impact. D10.0
    1. Describe the need for and role of habitat preservation. D10.1
    2. Describe the composition, role, and function of ecosystems, including trends affecting viability. D10.2
    3. Explain the laws and regulations pertaining to ecosystem preservation and use. D10.3
    4. Demonstrate the need for, and methods of, land use planning. D10.4
    5. Identify the aspects of land use planning and describe current trends. D10.5
    6. Summarize the relationship between land use planning and energy use and distribution. D10.6
    7. Explain the laws and regulations pertaining to land use planning. D10.7
    8. Develop strategies to maximize the effectiveness of land use planning. D10.8
11. Research the role of air quality management and systems, their operations, and their impact on the environment. D11.0
    1. Understand the elements that create outdoor air quality. D11.1
    2. Summarize the causes of air pollutants and their chemical composition. D11.2
    3. Research air pollutants and their threat to human health. D11.3
    4. Understand U.S. and California laws and regulations related to air pollution control programs and health effects of air pollution. D11.4
    5. Describe the basic U.S. Environmental Protection Agency (EPA) and California Air Resources Board (ARB) roles and regulations. D11.5

12 Implement processes to support energy efficiency. D12.0

1 Understand the relationship between power and energy efficiency. D12.1

2 Outline how domestic and industrial appliances and systems affect the environment, such as water units and heating and cooling systems. D12.2

3 Compare costs of alternate/renewable energy sources, systems, and appliances and traditional energy sources, systems, and appliances. D12.3

4 Conduct an energy audit. D12.4

13 Research drinking-water sources, systems, treatment, and conservation. D13.0

1 Understand water reuse: issues, strategies, technologies, and applications. D13.1

2 Analyze strategies for improving energy efficiencies in water collection and distribution. D13.2

3 Describe the role of environmental engineering and green energy in water systems. D13.3

4 Understand the functions and operations of water storage, reservoirs, aqueducts, and dams. D13.4

5 Identify and explain the applicable codes and regulations. D13.5

14 Evaluate the impact and flow management of storm water, rivers, and groundwater. D14.0

1 Understand the designs and tools used in water flow management. D14.1

2 Describe watershed modeling. D14.2

3 Understand the principles and applications of drainage engineering. D14.3

4 Use the Hydrologic Engineering Centers River Analysis System (HEC-RAS). D14.4

5 Analyze and interpret contaminated harbor and river sediment. D14.5

6 Describe the concerns and strategies for catastrophic storm water events and management. D14.6