Course Outline

Building and Construction Trades

REVISED: July/2021

Job Title
HVAC Technician

Career Pathway:
Mechanical Systems Installation and Repair

Industry Sector:
Building and Construction Trades

O*NET-SOC CODE:
49-9021.00

CBEDS Title:
Heating, Ventilation, and Air Conditioning (HVAC) Systems

CBEDS No.:
5516

72-85-60

HVAC/1

Credits: 15 **Hours:** 180

Course Description:
This competency-based course is the first in a sequence of three designed for heating, ventilating, and air-conditioning (HVAC). Instruction includes orientation and safety, resource management, trade mathematics, basic electrical theories, thermodynamics, heating and controls, troubleshooting and maintenance, and employability skills. The competencies in this course are aligned with the California High School Academic Content Standards and the California Career Technical Education Model Curriculum Standards.

Prerequisites:
Enrollment requires a reading level of 6.0 as measured by the CASAS GOALS test.

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

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

Los Angeles Unified School District
Division of Adult and Career Education
Instructional and Couseling Services Unit
Adult Curriculum Office
adultinstruction.org

COURSE OUTLINE COMPETENCY-BASED COMPONENTS

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

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

COURSE OUTLINE COMPONENTS	**LOCATION**
GOALS AND PURPOSES	Cover

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

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

PERFORMANCE OBJECTIVES OR COMPETENCIES	pp. 7-13

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

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

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

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

COURSE OUTLINE COMPETENCY-BASED COMPONENTS (continued)

COURSE OUTLINE COMPONENTS	LOCATION
INSTRUCTIONAL STRATEGIES	p. 15
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. 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.	pp. 7-14
EVALUATION PROCEDURES	p. 15
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

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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 Building and Construction Trades academic alignment matrix for identification of standards.

2.0 Communications
Acquire and accurately use Building and Construction Trades 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 Building and Construction Trades 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 Building and Construction Trades 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 Building and Construction Trades 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 Building and Construction Trades 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 Building and Construction Trades sector, following procedures when carrying out experiments or performing technical tasks.

11.0 Demonstration and Application
Demonstrate and apply the knowledge and skills contained in the Building and Construction Trades anchor standards, pathway standards, and performance indicators in classroom, laboratory, and workplace settings, and through the SkillsUSA career technical student organizations.

C. Mechanical Systems Installation and Repair Pathway

The Mechanical Systems Installation and Repair pathway provides students with competencies fundamental for preparing for employment or advanced training in heating, ventilation, air-conditioning (HVAC) and appliance installation, maintenance, and repair. The pathway includes preparation for a Class C California License and EPA certification.

Sample occupations associated with this pathway:

- HVAC Installation and Maintenance Specialist
- Plumbing Installer
- Sheet Metal Fabricator
- Mechanical Engineer/Technician
- Mechanical Construction Field Manager

C1.0 Demonstrate an understanding of the methods and devices used to improve air quality and comfort.

C2.0 Describe the basic components and concepts of heating, air-conditioning, and refrigeration.

C3.0 Demonstrate an understanding of the scientific theories and physical properties of heat and matter.

C4.0 Analyze the effects and reactions of fluids, pressures, and temperatures on refrigerants.

C5.0 Demonstrate skills necessary to fabricate and service the tubing, piping, and fittings utilized in accordance with accepted industry standards.

C6.0 Demonstrate the skills necessary to service, maintain, and repair heating, air-conditioning, and refrigeration system components and accessories.

C7.0 Demonstrate a practical knowledge of basic electricity and skills necessary to service and maintain the electrical components of heating, air-conditioning, and refrigeration equipment.

C8.0 Troubleshoot electrical control systems, motors, and their components.

C9.0 Demonstrate a practical knowledge of solid-state electronics.

C10.0 Demonstrate a practical knowledge of combustion heating systems.

C11.0 Demonstrate practical knowledge of systems designed to improve air quality.

CBE
Competency-Based Education

COMPETENCY-BASED COMPONENTS
for the HVAC/1 Course

COMPETENCY AREAS AND STATEMENTS	MINIMAL COMPETENCIES	STANDARDS
A. ORIENTATION AND SAFETY Understand, apply, and evaluate classroom and workplace policies and procedures used in accordance with federal, state, and local safety and environmental regulations.	1. Describe the scope and purpose of the course. 2. Describe the overall course content as a part of the Linked Learning Initiative. 3. Describe classroom policies and procedures. 4. Describe the different occupations in the Energy and Utilities Industry Sector, which have an impact on the role of HVAC technicians. 5. Describe the opportunities available for promoting gender equity and the representation of non-traditional populations in the HVAC field. 6. Describe the purpose of the California Occupational Safety and Health Administration (Cal/OSHA) and its laws governing HVAC technicians. 7. Describe the impact of Environmental Protection Agency (EPA) legislation on the Energy and Utilities Industry Sector practices. 8. Describe and demonstrate the procedures for contacting proper authorities for the removal of hazardous materials based on the EPA standards. 9. Describe the National Electrical Code (NEC) and its role in safeguarding the work conditions of HVAC technicians. 10. Describe and demonstrate the use of the Safety Data Sheet (SDS) as it applies to the HVAC field. 11. Describe the role of the Leadership in Energy and Environmental Design (LEED) Green Building Rating System™, American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE), and National Association of Home Builders (NAHB) in increasing the use of green and sustainable technology in California. 12. Describe the federal, state, and local Building and Safety Codes and their applications to the HVAC field. 13. Describe the provisions of the California Title 24 Energy Efficiency Standards (a.k.a. 2008 California Green Building Standards Code) as they relate to the Energy and Utilities Industry Sector.	**Career Ready Practice:** 1, 2, 3, 6, 7, 11, 12 **CTE Anchor:** Communications: 2.1 Career Planning and Management: 3.6 Health and Safety: 6.1, 6.2, 6.4, 6.6, 6.9, 6.11 Ethics and Legal Responsibilities: 8.2, 8.3, 8.4 Leadership and Teamwork: 9.4, 9.6 Technical Knowledge and Skills: 10.1, 10.2 **CTE Pathway:** C1.7, C1.8, C1.9

COMPETENCY AREAS AND STATEMENTS	MINIMAL COMPETENCIES	STANDARDS
(5 hours)	14. Describe classroom and workplace first aid and emergency procedures based on the American Red Cross (ARC) standards. 15. Describe how each of the following insures a safe workplace: a. employees' rights as they apply to job safety b. employers' obligations as they apply to safety c. adherence to pressure vessel guidelines d. adherence to electrical shock hazard (NFPA 70E) prevention guidelines e. adherence to mechanical safety guidelines f. adherence to safe lifting guidelines 16. Pass the safety test with 100% accuracy.	
B. RESOURCE MANAGEMENT Understand, apply, and evaluate resource management principles and techniques applied in the HVAC field. (5 hours)	1. Define the following: a. resources b. management c. sustainability 2. Describe and list specific examples of effective management of the following resources in the HVAC field: a. time b. materials (including sustainable and green) c. personnel 3. Describe the benefits of effective resource management in the HVAC field: a. profitability b. sustainability c. company growth 4. Describe the economic benefits and liabilities of managing resources in an environmentally responsible way.	**Career Ready Practice:** 1, 2, 3, 5, 7, 9 **CTE Anchor:** Communications: 2.1 Technology: 4.1 Problem Solving and Critical Thinking: 5.3 Health and Safety: 6.7, 6.11 Responsibility and Flexibility: 7.1, 7.3, 7.4, 7.6 Ethics and Legal Responsibilities: 8.1, 8.3, 8.4 Leadership and Teamwork: 9.2 **CTE Pathway:** C1.3, C4.8

COMPETENCY AREAS AND STATEMENTS	MINIMAL COMPETENCIES	STANDARDS
C. TRADE MATHEMATICS Understand, apply, and evaluate the mathematical requirements in the HVAC field. (15 hours)	1. Describe the practical applications of math in the HVAC field. 2. Describe and demonstrate problem-solving techniques involving whole number problems using arithmetic operations (addition, subtraction, multiplication, and division). 3. Describe and demonstrate problem-solving techniques involving: a. fraction problems using arithmetic operations. b. decimal problems using addition, subtraction, multiplication, and division 4. Describe and demonstrate techniques for changing a. fractions to decimals b. decimals to fractions 5. Describe and demonstrate the English and metric systems of measuring length, weight, volume, capacity, and temperature 6. Describe and demonstrate English and metric measuring techniques of objects by using tools common to the trade. 7. Express units in ascending and descending powers of ten. 8. Calculate square roots of numbers. 9. Describe and demonstrate problem-solving techniques for: a. geometric problems b. using percentages c. reading and interpreting graphs d. using a calculator	**Career Ready Practice:** 1, 2, 3, 5 **CTE Anchor:** Communications: 2.1, 2.3 Problem Solving and Critical Thinking: 5.1, 5.4 **CTE Pathway:** C1.5, C6.5
D. BASIC ELECTRICAL THEORIES Understand, apply, and evaluate basic electrical theories.	1. Define the following: a. matter b. atoms c. electrons d. molecules e. conductors f. insulators g. energy h. work i. electricity j. magnetism and polarity k. semiconductors 2. Define and describe the following: a. current i. direct current (DC) ii. alternating current (AC)	**Career Ready Practice:** 1, 2, 5, 10 **CTE Anchor:** Communications: 2.1, 2.2, 2.3 Problem Solving and Critical Thinking: 5.1, 5.2, 5.3 Technical Knowledge and Skills: 10.1

COMPETENCY AREAS AND STATEMENTS	MINIMAL COMPETENCIES	STANDARDS
(20 hours)	b. voltage c. power (a.k.a. watts) d. resistance (a.k.a. Ohms) e. current (a.k.a. amperage) f. Watt's Law g. Ohm's Law h. series, parallel, and combination circuits 3. Describe the following: a. refrigeration and air conditioning applications for AC and DC b. three-phase electrical power 4. Describe and demonstrate the following: a. calculation of the values of a simple light circuit using Watt's Law b. identification of various power supplies c. analysis of basic electrical problems d. repair of basic electrical problems e. reading of line volt unit wiring diagrams	**CTE Pathway:** C7.1, C7.2, C7.3, C7.4, C7.5, C7.6
E. THERMODYNAMICS Understand, apply, and evaluate the principles of matter and heat.	1. Define the following: a. thermodynamics b. potential energy c. kinetic energy d. heat e. temperature f. volume g. pressure h. temperature measurement i. British Thermal Unit (BTU) j. Enthalpy 2. Identify and describe the features of the three states of matter: a. solid b. liquid c. vapor 3. Define and describe the following heat transfer methods: a. conduction b. convection (natural and forced) c. radiation 4. Define the following: a. solidification b. liquefaction c. vaporization d. condensation	**Career Ready Practice:** 1, 2, 5 **CTE Anchor:** Communications: 2.1 Problem Solving and Critical Thinking: 5.1, 5.3 Technical Knowledge and Skills: 10.1 **CTE Pathway:** C1.1, C1.2, C1.4, C1.5, C3.4, C3.5, C4.2

COMPETENCY AREAS AND STATEMENTS	MINIMAL COMPETENCIES	STANDARDS
(25 hours)	e. sublimation 5. Define and describe the following: a. Conservation: first law of thermodynamics b. Entropy: second law of thermodynamics c. Boyle's Law 6. Describe the following: a. differences between heat and temperature b. differences between latent heat and sensible heat c. differences between natural and forced heat convection d. relationship of pressures and fluids at different temperatures e. effects of pressurization on boiling points f. air discharge patterns g. air return patterns h. air flow patterns i. differences between heat pump systems versus other temperature control systems j. thermal efficiency of a heat pump k. component isolation in heat pumps l. auxiliary heat in heat pumps	
F. HEATING AND CONTROLS Understand, apply, and evaluate the operational techniques used for heating systems.	1. Identify and describe the features and functions of the following: a. heating systems i. traditional furnaces • gas furnaces • electric furnace ii. electric heat pump iii. radiant baseboard heat iv. radiant ceiling or floor heat v. space heaters vi. boilers (a.k.a. steam generator) b. thermostats i. low voltage • mercury contact • mechanical contact • digital • electronic programmable ii. line voltage c. fan and limit control d. spark ignition e. pilot proving devices 2. Describe and demonstrate the following: a. wiring a complete heating system line and low voltage b. testing spark ignition modules	**Career Ready Practice:** 1, 2, 3, 10 **CTE Anchor:** Communications: 2.1 Problem Solving and Critical Thinking: 5.1, 5.3 **CTE Pathway:** C7.1, C7.2, C7.3, C7.4, C7.5, C7.6, C7.7, C9.5, C10.1, C10.4, C10.5, C10.6, C10.7

COMPETENCY AREAS AND STATEMENTS	MINIMAL COMPETENCIES	STANDARDS
(50 hours)	c. testing and changing a thermocouple flame sensor d. operating heat pumps e. setting up a programmable thermostat for heating f. diagnosing and solving heat pump problems	
G. TROUBLESHOOTING AND MAINTENANCE Understand, apply, and evaluate troubleshooting and maintenance techniques used for heating systems. (50 hours)	1. Identify and describe principles of maintenance and troubleshooting. 2. Describe the following: a. ways of troubleshooting problems in a gas furnace b. ways of troubleshooting problems in a gas appliance c. ways of troubleshooting problems in an electric heat pump d. ways of troubleshooting problems in a boiler e. ways of preventing the reoccurrence of a problem 3. Describe and demonstrate the following: a. performing maintenance check on a gas furnace b. maintaining electronic air cleaners c. maintaining electric heaters d. maintaining auxiliary heat on heat pumps e. maintaining a boiler f. installing properly sized disposable filters 4. Document and report on the following: a. performing maintenance check on a gas furnace b. maintaining electronic air cleaners c. maintaining electric furnaces d. maintaining heat pumps e. maintaining a boiler f. installing properly sized disposable filters	**Career Ready Practice:** 1, 2, 3, 5, 10 **CTE Anchor:** Communications: 2.1 Technology: 4.1, 4.2 Problem Solving and Critical Thinking: 5.1, 5.2, 5.3, 5.4 Health and Safety: 6.1, 6.6, 6.12 Ethics and Legal Responsibilities: 8.1, 8.3, 8.4 Technical Knowledge and Skills: 10.5 **CTE Pathway:** C6.10, C7.6, C8.2, C8.6, C8.10, C10.1, C10.2, C10.4, C10.5, C10.6, C10.7
H. EMPLOYABILITY SKILLS Understand, apply, and evaluate the processes involved in seeking, gaining, and maintaining	1. Describe employer requirements for the following: a. punctuality b. attendance c. attitude toward work d. quality of work e. teamwork f. timeliness	**Career Ready Practice:** 1, 2, 3, 5, 7, 8, 11 **CTE Anchor:** Communications: 2.1, 2.3, 2.4

COMPETENCY AREAS AND STATEMENTS	MINIMAL COMPETENCIES	STANDARDS
employment. (10 hours)	g. communication skills h. computer skills and software applications 2. Identify potential employers through traditional and internet sources. 3. Describe the role of electronic social networking in job search. 4. Design sample résumés and cover letters. 5. Describe the importance of filling out a job application legibly, with accurate and complete information. 6. Complete sample job application forms correctly. 7. Describe the importance of: a. enthusiasm on a job b. appropriate appearance and hygiene on a job c. continuous upgrading of job skills 8. Describe customer service as a method of building permanent relationships between the organization and the customer. 9. Describe and demonstrate appropriate interviewing techniques. 10. Identify the informational materials and resources needed to be successful in an interview. 11. Design sample follow-up letters. 12. Describe and demonstrate appropriate follow-up procedures. 13. State the importance of: a. driving record b. background check c. credit report	Career Planning and Management: 3.1, 3.2, 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 **CTE Pathway:** C1.2, C1.8, C1.9

SUGGESTED INSTRUCTIONAL MATERIALS and OTHER RESOURCES

TEXTS AND SUPPLEMENTAL BOOKS

Herman, Stephen L. and Bennie Sparkman. Electricity and Controls for HVAC/R, 6th Edition. Cengage Learning, 2009.

Raynes, Frank W. Heating Systems. Nabu Press, 2010.

Robertson, C.R. Fundamental Electrical and Electronic Principles. Elsevier Science and Technology, 2008.

Stanfield, Carter and David Skaves. Fundamentals of HVAC/R. Prentice Hall, 2009.

Ward, Ray. Domestic Central Heating Wiring Systems and Controls. Elsevier Science and Technology, 2005.

Johnson, Jim. HVACR Troubleshooting Fundamentals Electricity & Wiring Diagrams, Technical Training, 2019

John Tomcyzyk, Eugene Silberstein, Bill Whitman, Bill Johnson. Refrigeration and Air Conditioning Technology 8th Edition. Cengage Learning, 2019

RESOURCES

Employer Advisory Board members

CTE Model Curriculum Standards
http://www.cde.ca.gov/ci/ct/sf/documents/buildingconstruct.pdf

COMPETENCY CHECKLIST

TEACHING STRATEGIES and EVALUATION

METHODS AND PROCEDURES

A. Lectures and discussions

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

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

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

SECTION D – Basic Electrical Theories – Pass all assignments and exams on basic electrical theories with a minimum score of 80% or higher.

SECTION E – Thermodynamics – Pass all assignments and exams on thermodynamics with a minimum score of 80% or higher.

SECTION F – Heating and Controls – Pass all assignments and exams on heating and controls with a minimum score of 80% or higher.

SECTION G – Troubleshooting and Maintenance – Pass all assignments and exams on troubleshooting and maintenance with a minimum score of 80% or higher.

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

Standards for Career Ready Practice

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

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

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

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

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

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

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

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

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

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

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

10. Demonstrate creativity and innovation.

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

11. Employ valid and reliable research strategies.

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

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

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

Statement for Civil Rights

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