



Regional Occupational Program

Automotive Engine Performance

2025-2026

COURSE DESCRIPTION

This course provides training for students specializing in engine tune-up and repair. Instruction includes theory and hands-on experiences focusing on understanding, diagnosing and repairing engines and related electrical and fuel/emission systems to improve performance. Experiences will be provided using hand tools, power tools, testing and troubleshooting equipment, as well as service manuals. Safety will be taught throughout the course. Students that achieve competency in this course will obtain entry-level skills necessary for employment as an automotive service person. These skills will provide students with a solid foundation for continued training in this field.

Course Information

Course Length: 1 Semester
 Prerequisite: None
 Course Level: Introductory
 UC: No
 Articulated: No
 Industry Cert.: No
 Industry Sector: Transportation
 Pathway: Systems Diagnostics,
 Service and Repair
 CALPADS: 8530

O*Net SOC Codes

49-3023 Automotive Service Technicians
 and Mechanics
 49-3031 Bus and Truck Mechanics and
 Diesel Engine Specialists

Legend

CTE - PS CTE Pathway Standards
 CRP Career Ready Practices
 CTE - AS CTE Anchor Standards
 CCSS Common Core State Standards
 ISTE International Society for Technology in Education

*Includes updates from 24/25 Transportation Advisory
[Advisory Minutes](#)*

Automotive Engine Performance

Course Orientation

- a. Discuss objectives for this course, including competencies, teacher expectations, classroom policies, and procedures.
- b. Identify and discuss the acquisition of transferable skills (communication, collaboration, creativity, and critical thinking) and their importance to being college and career ready and for future personal and professional success.
- c. Review objectives, competencies, and course syllabus.
- d. Discuss student and teacher expectations, including behavior, class rules, appropriate dress, pre-course knowledge, and grading policies, including enrollment and attendance requirements and procedures, and classroom/school safety and disaster procedures.
- e. Discuss next steps in course sequence related to the career pathway, the need for reinforcement of basic skills, transferrable skills, and postsecondary and career options.
- f. Discuss the Big Six: Career Ready Essentials and the Standards for Career Ready Practice as they relate to this course, all aspects of the industry sector, and being college and career ready.

Big Six: Career Ready Essentials

1. Effective Communication	CTE - PS	CRP	CTE - AS	CCSS	ISTE
<ol style="list-style-type: none"> a. Demonstrate effective verbal communication and conflict resolution skills. Use the writing process to develop written communication with the appropriate tone, organization, and format for the identified audience. b. Use the writing process to develop written communication with the appropriate tone, organization, and format for the identified audience. c. Explain the effect of interpersonal skills on one's ability to communicate effectively and develop relationships. d. Describe the impact of ineffective communication on business relationships. e. Analyze the impact of vocabulary, body language, and tone on verbal communication. f. Demonstrate active listening skills. g. Accurately interpret industry-specific written communication. h. Model responsible and effective use of various communication technologies. i. Identify valid and reliable digital reference and resource materials. j. Gather information from multiple digital sources to compare and contrast, synthesize, and summarize. k. Identify and use appropriate communication and collaboration technologies. l. Utilize technology to problem solve, accomplish tasks, and to produce or publish products. 		<u>1</u> <u>2</u> <u>11</u>	<u>2</u> <u>3</u> <u>4</u> <u>5</u> <u>7</u> <u>8</u> <u>9</u> <u>10</u> <u>11</u>	<u>LS</u> <u>9-10</u> <u>11-12.6</u> <u>SLS</u> <u>11-12.2</u> <u>9-10</u> <u>11-12.1</u> <u>11-12.1d</u> <u>WS</u> <u>11-12.7</u> <u>11-12.6</u>	<u>1b,c</u> <u>2c</u> <u>3b,c</u> <u>5c</u> <u>6b,c,d</u>
2. Collaboration, Creativity, and Critical Thinking	CTE - PS	CRP	CTE - AS	CCSS	ISTE
<ol style="list-style-type: none"> a. Demonstrate critical thinking skills for a variety of purposes and in different settings. Collaborate to reach consensus on an identical objective through the sharing of knowledge, tasks, and learning. 		<u>2</u> <u>4</u> <u>5</u>	<u>2</u> <u>3</u> <u>4</u>	<u>LS</u> <u>9-10</u> <u>11-12.6</u>	<u>1c</u> <u>3c,d</u> <u>4a-d</u>

<p>b. Collaborate to reach consensus on an identical objective through the sharing of knowledge, tasks, and learning.</p> <p>c. Discuss the importance of the critical thinking process to real-world applications.</p> <p>d. Evaluate the impact of creative thinking on problem solving and innovation in real-world applications.</p> <p>e. Compile work that demonstrates the process used to (elaborate, refine, analyze) evaluate original ideas and maximize creative efforts.</p> <p>f. Apply divergent and convergent thinking to the development of an original idea or solution.</p> <p>g. Examine real-world limits to adopting ideas.</p> <p>h. Demonstrate creative thinking (preparation, insight, evaluation, elaboration, and communication) to create a new idea or concept.</p> <p>i. Assume shared responsibility for collaborative work, and value the individual contributions made by each team member.</p> <p>j. Evaluate evidence, arguments, claims, and beliefs to identify connections.</p> <p>k. Identify bias, prejudice, propaganda, self-deception, distortion, and misinformation.</p> <p>l. Produce intellectual, informational, or material products that serve an authentic purpose.</p> <p>m. Work effectively and respectfully with those from diverse backgrounds or cultures.</p> <p>n. Demonstrate respect, trust, commitment, and the ability to compromise in collaborative projects.</p>		<p><u>7</u> <u>9</u> <u>10</u> <u>11</u></p>	<p><u>5</u> <u>7</u> <u>8</u> <u>9</u> <u>11</u></p>	<p>SLS <u>9-10</u> <u>11-12.1</u> <u>11-12.1d</u> <u>11-12.2</u></p> <p>WS <u>11-12.7</u> <u>11-12.6</u></p>	<p><u>5c,d</u> <u>6c</u> <u>7b,c,d</u></p>
<p>3. Leaders and Teams: Roles and Responsibilities</p>	<p>CTE - PS</p>	<p>CRP</p>	<p>CTE - AS</p>	<p>CCSS</p>	<p>ISTE</p>
<p>a. Determine the individual and team members' roles and responsibilities.</p> <p>b. Demonstrate leadership skills and qualities (i.e., reliability, negotiation skills, initiative, positive reinforcement, recognition of others' efforts, problem-solving skills, conflict resolution, and delegation).</p> <p>c. Explain the importance of technical, social, and communication skills to team success.</p> <p>d. Compare and contrast leadership styles and their effectiveness in various situations.</p> <p>e. Organize and delegate responsibilities in a team setting to encourage ideas, perspectives, and contributions from all team members.</p> <p>f. Develop a strong sense of team identity by brainstorming solutions, volunteering, assisting others, practicing respect and courtesy, and taking initiative.</p> <p>g. Examine situations in which a follower becomes the leader.</p> <p>h. Describe twenty-first-century skills required across all occupations.</p> <p>i. Identify and discuss the characteristics of a successful team (i.e., leadership, cooperation, and effective decision-making).</p> <p>j. Leverage social and cultural differences to increase innovation and quality of work.</p>		<p><u>7</u> <u>8</u> <u>9</u></p>	<p><u>3</u> <u>7</u> <u>8</u> <u>9</u> <u>11</u></p>	<p>SLS <u>11-12.2</u> <u>9-10</u> <u>11-12.1</u> <u>11-12.1d</u></p> <p>WS <u>11-12.6</u></p>	<p><u>7a,c</u></p>

4. Legal, Ethical, and Environmental Considerations	CTE - PS	CRP	CTE - AS	CCSS	ISTE
<ul style="list-style-type: none"> a. Demonstrate industry specific ethical and legal practices. b. Identify eco-friendly industry specific practices and resources. c. Identify local, state, and federal regulatory agencies, entities, laws, and regulations. d. Identify discrimination based on race, nationality, religion, gender, age, disability, or sexual orientation. e. Summarize the ethical and legal implications of workplace discrimination and harassment. f. Explain the concept of corporate citizenship. g. Examine an employer's role in protecting the health and welfare of employees, the community, and the environment. h. Analyze current environmental laws and regulations and their impact on industry. i. Compare and contrast both society's and industry's impact on the environment. 		<u>5</u> <u>7</u> <u>8</u> <u>12</u>	<u>3</u> <u>5</u> <u>7</u> <u>8</u> <u>9</u> <u>11</u>	<u>WS</u> <u>11-12.6</u> <u>11-12.7</u> <u>SLS</u> <u>9-10</u> <u>11-12.1</u> <u>11-</u> <u>12.1d</u> <u>11-12.2</u>	<u>2a,b</u> <u>3a,b</u> <u>5c</u> <u>6c</u>
5. Personal Growth and Career Planning	CTE - PS	CRP	CTE - AS	CCSS	ISTE
<ul style="list-style-type: none"> a. Demonstrate continued personal development and growth. b. Develop and manage a personal growth and career plan. c. Explain the relationship between sound financial habits and financial security. d. Create and manage a personal financial plan. e. Demonstrate initiative in achieving personal and professional goals. f. Apply time management strategies to meet deadlines. g. Demonstrate a growth mindset through flexibility and a positive attitude. h. Select and demonstrate appropriate job-search and retention techniques. i. Demonstrate strategies to prepare for employment. j. Demonstrate interpersonal skills appropriate for the workplace. k. Elaborate on the importance of perseverance to personal and professional success. l. Discover personal career interests, aptitudes, and skills. 		<u>1</u> <u>2</u> <u>3</u> <u>4</u> <u>6</u>	<u>2</u> <u>3</u> <u>4</u> <u>7</u> <u>8</u> <u>11</u>	<u>LS</u> <u>9-10</u> <u>11-12.6</u> <u>SLS</u> <u>9-10</u> <u>11-12.1</u> <u>11-12.1d</u> <u>11-12.2</u> <u>WS</u> <u>11-12.6</u>	<u>1a</u> <u>3a,c</u> <u>4d</u> <u>6a,d</u> <u>7b</u>
6. Workplace Safety and Personal Wellness	CTE - PS	CRP	CTE - AS	CCSS	ISTE
<ul style="list-style-type: none"> a. Demonstrate proper industry specific safe work practices to prevent injury or illness. b. Assess the potential impact of goal setting on personal and professional success. c. Describe the role of security and emergency procedures in workplace safety. d. Describe the effect of preventative measures on emergencies in the workplace. e. Identify and describe the causes, prevention, and treatment of common accidents. f. Identify local, state, and federal agencies that regulate workplace safety. g. Explain the role of the California Occupational Safety and Health Administration (Cal-OSHA) and the Environmental Protection Agency (EPA). h. Discuss the basics of system operations. i. Demonstrate the proper use of personal protective equipment (PPE). j. Explain the purpose of and accurately interpret a Safety Data Sheet (SDS). 		<u>2</u> <u>5</u> <u>6</u> <u>8</u> <u>12</u>	<u>2</u> <u>5</u> <u>6</u> <u>7</u> <u>8</u> <u>10</u> <u>11</u>	<u>LS</u> <u>9-10</u> <u>11-12.6</u> <u>WS</u> <u>11-12.7</u> <u>11-12.6</u> <u>SLS</u> <u>9-10</u> <u>11-12.1</u>	<u>1a,d</u> <u>2a,d</u> <u>5b</u>

<ul style="list-style-type: none"> k. Identify hazardous materials and chemicals. l. Demonstrate proper procedures to respond to work-related accidents and injuries. m. Describe how ergonomics, housekeeping, and maintenance are related to accidents and injuries. n. Demonstrate cyber ethics, cyber safety, and cybersecurity. o. Assess the potential impact of preventative physical and mental health measures on workplace safety. 				11-12.1d	
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Automotive Engine Performance Units of Instruction

7. Safety	CTE - PS	CRP	CTE- AS	CCSS	ISTE
<ul style="list-style-type: none"> a. Demonstrate the practice of personal and occupational safety and protecting the environment by using materials and processes in accordance with manufacturer and industry standards. b. Describe common environmental conservation practices and their applications. c. Demonstrate the correct procedures for handling, storing, and disposing of hazardous or flammable materials. d. Discuss the importance of following the safety procedures used in automotive service. e. Explain and demonstrate safety rules for personal and general shop safety including PPEs- eye, ear, feet, and body protection. f. Utilize and define safety-color codes used throughout the transportation industry. g. Apply general safety rules associated with working on various vehicle systems, including hybrid vehicles. h. Describe the way in which gases, emissions, and other environmentally destructive substances are generated and the effects of these substances on the environment. i. Demonstrate the safe handling and storage of chemicals and hazardous waste in accordance with Material Safety Data Sheets (MSDS) and the requirements of local, state, and federal regulatory agencies. j. Correctly interpret data found on a hazardous material safety data sheet (MSDS) and government requirements. k. Describe first aid procedures for an accident involving hazardous materials. 	C1.0 C1.2 C1.4	1 2 5 6 11 12	1 2 5 6 11	LS 9-10 11-12.6 WS 11-12.7 RSTS 9-10 11-12.4	
8. Tools and Equipment	CTE - PS	CRP	CTE - AS	CCSS	ISTE
<ul style="list-style-type: none"> a. Demonstrate the use and safe handling practices of tools, equipment, and work process standards within the Automotive Industry. b. Identify and demonstrate the proper use of the appropriate tools and equipment used to diagnose, service, repair, and maintain systems and components. c. Identify and demonstrate the proper and safe use of tools, equipment, and machines to measure, test, diagnose circuits such as alternating and direct current applications, fluid/hydraulic and air/pneumatic systems. 	C2.0 C2.2	1 2 5 6 11	1 2 5 6 11	LS 9-10 11-12.6 WS 11-12.7 RSTS 9-10	

d. Identify and demonstrate the safe and proper use of common hand tools, lifting, and hoisting equipment.				11-12.4	
9. Automotive Math and Precision Management	CTE - PS	CRP	CTE - AS	CCSS	ISTE
a. Demonstrate knowledge of the appropriate use of mathematical functions and measurement techniques commonly used in the automotive industry.	C2.4 C2.7	1 2	1 2	LS 9-10	
b. Explain the importance of the calibration processes, systems, and techniques using various measurement and testing devices.		5 6	5 6	11-12.6 WS	
c. Select and use the appropriate measurement devices and use appropriate mathematical functions to perform required fabrication, maintenance, and operation procedures.		11	11	11-12.7 RSTS	
d. Identify and describe the standard and metric measuring systems.				9-10	
e. Demonstrate mathematical computations and apply the results to a given project.				11-12.4	
f. Demonstrate the safe and proper use and interpretation of precision measurement tools, scales, devices, and systems, such as dial indicators, and micrometers used to design, fabricate, diagnose, maintain, and repair vehicles following recommended industry standards.					
10. Cooling and Lubrication	CTE - PS	CRP	CTE - AS	CCSS	ISTE
a. Demonstrate knowledge and basic skills in maintaining, diagnosing, and repairing lubrication and cooling systems.	C3.7	1 2	1 2	LS 9-10	
b. Identify the major components of an automotive lubrication system and describe their function.	C6.2	5 11	5 11	11-12.6 WS	
c. Describe and diagnose common symptoms of high and low temperature cooling system problems.				11-12.7	
d. Demonstrate proper diagnostic techniques and utilization of test equipment for lubricating systems.					
e. Demonstrate the proper maintenance procedures for cooling and lubrication systems.					
f. Describe the various types of antifreeze and how to safely recycle and discard used coolant.					
g. Describe the lubrication systems, their components and the proper maintenance of oil and water pumps, filters, etc.					
11. Electrical Systems/Electronics	CTE - PS	CRP	CTE - AS	CCSS	ISTE
a. Demonstrate knowledge and basic skills in the function, principles, and operation of electrical and electronic systems using manufacturer and industry standards.	C2.3 C3.5	1 2	1 2	LS 9-10	
b. Describe and demonstrate maintenance, diagnosis, and repair of electrical systems.	C7.0	5	5	11-12.6	
c. Describe and demonstrate the safety practices that should be followed when working with electrical systems.	C7.1 C7.2	11	11	WS 11-12.7	
d. Describe and demonstrate the proper maintenance, diagnosis, service, and repair of batteries.					

<p>e. Describe and demonstrate the maintenance, diagnosis, service, and repair of starting and charging systems.</p> <p>f. Describe and demonstrate the diagnosis, service, and repair of ancillary automotive systems, i.e., lighting, washers, heating/cooling systems and their components, horns, and other automotive accessories.</p>					
<p>12. Engine Performance and Tune Up</p>	<p>CTE - PS</p>	<p>CRP</p>	<p>CTE - AS</p>	<p>CCSS</p>	<p>ISTE</p>
<p>a. Demonstrate knowledge and basic skills in general engine maintenance, diagnosis, service, and repair in accordance with portable national industry standards, such as the National Automotive Technicians Education foundation and the Equipment and Engine Training Council.</p> <p>b. Describe and demonstrate the operation, maintenance, and diagnosis of engines, but not limited to two- or four-stroke and supporting subsystems.</p> <p>c. Communicate common engine performance problems and their corrections. identify and describe the components of an engine.</p> <p>d. Identify the visual checks to determine engine condition.</p> <p>e. Describe the operating principles of internal and/or external combustion engines.</p> <p>f. Verify operation of the instrument panel engine warning indicators.</p> <p>g. Identify and describe common symptoms of mechanical problems in an engine.</p> <p>h. Describe how to perform a dry and wet compression test.</p> <p>i. Explain how to perform common fastener and thread repair, to include: remove broken bolt, restore internal and external threads, and repair internal threads with thread insert.</p> <p>j. Demonstrate proper repair techniques using appropriate tools and equipment.</p>	<p>C3.1 C3.7</p>	<p><u>1</u> <u>2</u> <u>5</u> <u>11</u></p>	<p><u>1</u> <u>2</u> <u>5</u> <u>11</u></p>	<p>LS 9-10 11-12.6 WS 11-12.7</p>	
<p>13. Computer Systems</p>	<p>CTE - PS</p>	<p>CRP</p>	<p>CTE - AS</p>	<p>CCSS</p>	<p>ISTE</p>
<p>a. Demonstrate knowledge of the hardware, software and on-line systems to access, organize and maintain information on diagnostic procedures of common computers.</p> <p>b. Discuss the operation and use of scanning tools in communicating with automotive computers.</p> <p>c. Explain how to download files from a remote computer using a communications program to reprogram an automotive computer.</p> <p>d. Diagnose an electronic system circuit problem using a scan tool to determine necessary action.</p> <p>e. Check modular communication errors using a scan tool.</p> <p>f. Describe how to maintain, diagnose, and repair computerized engine control systems.</p>	<p>C6.3 C6.4</p>	<p><u>1</u> <u>2</u> <u>4</u> <u>5</u> <u>11</u></p>	<p><u>1</u> <u>2</u> <u>4</u> <u>5</u> <u>11</u></p>	<p>LS 9-10 11-12.6 WS 11-12.6 WS 11-12.7</p>	
<p>14. Fuel Systems</p>	<p>CTE - PS</p>	<p>CRP</p>	<p>CTE - AS</p>	<p>CCSS</p>	<p>ISTE</p>
<p>a. Demonstrate knowledge and basic skills in the appropriate diagnostic and repair procedures for fuel systems.</p>	<p>C6.4</p>	<p><u>1</u> <u>2</u></p>	<p><u>1</u> <u>2</u></p>	<p>LS 9-10</p>	

<ul style="list-style-type: none"> b. Describe the role of fuel tanks, lines and pumps in the fuel delivery system. c. Compare and contrast throttle-body design and port fuel-injection design fuel injection systems. d. Explain how a gasoline direct-injection system works. e. Identify and describe common fuel system problems and appropriate repair procedures. f. Demonstrate the use of appropriate diagnostic and maintenance techniques for fuel systems. g. Identify and describe fuel systems operation. 		<u>5</u> <u>11</u>	<u>5</u> <u>11</u>	<u>11-12.6</u> <u>WS</u> <u>11-12.7</u>	
15. Emissions	CTE - PS	CRP	CTE - AS	CCSS	ISTE
<ul style="list-style-type: none"> a. Demonstrate knowledge and basic skills in the diagnose and repair common emission system problems. b. Understand how emissions and environmentally destructive substances affect the environment. c. Describe the purpose and function of the exhaust gas recirculation system. d. Demonstrate proper diagnostic procedures of the emission system. e. Summarize and demonstrate the use of various emission control test equipment. f. Utilize appropriate repair techniques. g. Explain how waste gases, emissions, and other environmentally destructive substances are generated and the effects of these substances on the environment. 	<u>C1.3</u>	<u>1</u> <u>2</u> <u>5</u> <u>11</u>	<u>1</u> <u>2</u> <u>5</u> <u>11</u>	<u>LS</u> <u>9-10</u> <u>11-12.6</u> <u>WS</u> <u>11-12.7</u>	

Standards Alignment

The curricula have been aligned with the CTE Model Curriculum Standards released in 2013. Each industry sector was updated to meet the increased rigor and relevancy requirements of the Common Core State Standards. The curriculum also includes the new Standards for Career Ready Practices.

Standards for Career Ready Practice

1. *Apply appropriate technical skills and academic knowledge.*
2. *Communicate clearly, effectively, and with reason.*
3. *Develop an education and career plan aligned with personal goals.*
4. *Apply technology to enhance productivity.*
5. *Utilize critical thinking to make sense of problems and persevere in solving them.*
6. *Practice personal health and understand financial literacy.*
7. *Act as a responsible citizen in the workplace and the community.*
8. *Model integrity, ethical leadership, and effective management.*
9. *Work productively in teams while integrating cultural and global competence.*
10. *Demonstrate creativity and innovation.*
11. *Employ valid and reliable research strategies.*
12. *Understand the environmental, social, and economic impacts of decisions.*

CTE Anchor Standards—Common Core English Language Arts Alignment

Anchor Standard 1: Academics

Analyze and apply appropriate academic standards required for successful industry sector pathway completion leading to postsecondary education and employment. Refer to the industry sector alignment matrix for identification of standards. Note: alignment listed within each sector.

Anchor Standard 2: Communications

Language Standard: Acquire and accurately use general academic and domain-specific words and phrases sufficient for reading, writing, speaking, and listening at the (career and college) readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression. LS 9-10, 11-12.6

Anchor Standard 3: Career Planning and Management

Speaking and Listening Standard: Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data. SLS 11-12.2

Anchor Standard 4: Technology

Writing Standard: Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments and information.

Anchor Standard 5: Problem Solving and Critical Thinking

Writing Standard: Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem, narrow or broaden the inquiry when appropriate, and synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. WS 11-12.7

Anchor Standard 6: Health and Safety

Reading Standards for Science and Technical Subjects: Determine the meaning of symbols, keywords, and other domain-specific words and phrases as they are used in a specific scientific or technical context. RSTS 9-10, 11-12.4

Anchor Standard 7: Responsibility and Flexibility

Speaking and Listening Standard: Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners, building on others' ideas and expressing their own clearly and persuasively. SLS 9-10, 11-12.1

Anchor Standard 8: Ethics and Legal Responsibilities

Speaking and Listening Standard: Respond thoughtfully to diverse perspectives; synthesize comments, claims, and evidence made on all sides of an issue; resolve contradictions when possible; and determine what additional information or research is required to deepen the investigation or complete the work. SLS 11-12.1d

Anchor Standard 9: Leadership and Teamwork

Speaking and Listening Standard: Work with peers to promote civil, democratic discussions and decision making; set clear goals and deadlines; and establish individual roles as needed. SLS 11-12.1b

Anchor Standard 10: Technical Knowledge and Skills

Writing Standard: Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information. WS 11-12.6

Anchor Standard 11: Demonstration and Application

Demonstrate and apply the knowledge and skills contained in the industry-sector anchor standards, pathway standards, and performance indicators in the classroom, laboratory, and workplace settings, and the career technical student organization. Note: no alignment evident for this standard. WS 11-12.6

CTE Model Curriculum Standards—Industry Sectors and Pathways

Transportation

C. Systems Diagnostics, Service, and Repair Pathway

- C1.0 *Demonstrate the practice of personal and occupational safety and protecting the environment by using materials and processes in accordance with manufacturer and industry standards.*
- C1.2 *Practice the safe handling and storage of chemicals and hazardous wastes in accordance with Material Safety Data Sheets (MSDS) and the requirements of local, state, and federal regulatory agencies.*
- C1.3 *Understand the way in which waste gases, emissions, and other environmentally destructive substances are generated and the effects of these substances on the environment.*
- C1.4 *Use appropriate personal protective equipment and safety practices.*
- C2.0 *Practice the safe and appropriate use of tools, equipment, and work processes.*
- C2.2 *Demonstrate and use appropriate tools and equipment—such as wrenches, sockets, and pliers—to diagnose, service, repair, and maintain systems and components.*
- C2.3 *Use tools, equipment, and machines to safely measure, test, diagnose, and analyze components and systems (e.g., electrical and electronic circuits, alternating- and direct-current applications, fluid/hydraulic and air/pneumatic systems).*
- C2.4 *Select and use the appropriate measurement device(s) and use mathematical functions necessary to perform required fabrication, maintenance, and operation procedures.*
- C3.1 *Describe the operating principles of internal and/or external combustion engines*
- C3.5 *Practice the basic principles of electricity, electronics and electrical power generation, and distribution systems.*
- C3.7 *Perform necessary procedures to maintain, diagnose, service, and repair vehicle systems and malfunctions.*
- C6.0 *Demonstrate the application, operation, maintenance, and diagnosis of engines, including but not limited to two- and four-stroke and supporting subsystems.*
- C6.2 *Maintain, diagnose, service, and repair lubrication and cooling systems.*
- C6.3 *Practice how to maintain, diagnose, and repair computerized engine control systems and other engine-related systems.*
- C6.4 *Maintain, diagnose, service, and repair ignition, electronic, and computerized engine controls and fuel management systems.*
- C7.0 *Demonstrate the function, principles, and operation of electrical and electronic systems using manufacturer and industry standards.*
- C7.1 *Practice maintenance, diagnosis, and repair of electrical systems.*
- C7.2 *Maintain, diagnose, repair, and service batteries.*

ISTE Standards for Students

1. Empowered Learner- *Students leverage technology to take an active role in choosing, achieving, and demonstrating competency in their learning goals, informed by the learning sciences.*

- a) Students articulate and set personal learning goals, develop strategies leveraging technology to achieve them, and reflect on the learning process itself to improve learning outcomes.*
- b) Students build networks and customize their learning environments in ways that support the learning process.*
- c) Students use technology to seek feedback that informs and improves their practice and to demonstrate their learning in a variety of ways*
- d) Students understand the fundamental concepts of technology operations, demonstrate the ability to choose, use and troubleshoot current technologies and are able to transfer their knowledge to explore emerging technologies.*

2. Digital Citizen- *Students recognize the rights, responsibilities, and opportunities of living, learning, and working in an interconnected digital world, and they act and model in ways that are safe, legal, and ethical.*

- a) Students cultivate and manage their digital identity and reputation and are aware of the permanence of their actions in the digital world.*
- b) Students engage in positive, safe, legal, and ethical behavior when using technology, including social interactions online or when using networked devices.*
- c) Students demonstrate an understanding of and respect for the rights and obligations of using and sharing intellectual property.*
- d) Students manage their personal data to maintain digital privacy and security and are aware of data-collection technology used to track their navigation online.*

3. Knowledge Constructor- *Students critically curate a variety of resources using digital tools to construct knowledge, produce creative artifacts, and make meaningful learning experiences for themselves and others.*

- a) Students plan and employ effective research strategies to locate information and other resources for their intellectual or creative pursuits.*
- b) Students evaluate the accuracy, perspective, credibility, and relevance of information, media, data, or other resources.*
- c) Students curate information from digital resources using a variety of tools and methods to create collections of artifacts that demonstrate meaningful connections or conclusions.*
- d) Students build knowledge by actively exploring real-world issues and problems, developing ideas and theories, and pursuing answers and solutions.*

4. Innovative Designer- *Students use a variety of technologies within a design process to identify and solve problems creating new, useful, or imaginative solutions.*

- a) Students know and use a deliberate design process for generating ideas, testing theories, creating innovative artifacts, or solving authentic problems.*
- b) Students select and use digital tools to plan and manage a design process that considers design constraints and calculated risks.*
- c) Students develop, test, and refine prototypes as part of a cyclical design process.*
- d) Students exhibit a tolerance for ambiguity, perseverance, and the capacity to work with open-ended problems.*

5. Computational Thinker- *Students develop and employ strategies for understanding and solving problems in ways that leverage the power of technological methods to develop and test solutions.*

- a) Students formulate problem definitions suited for technology-assisted methods such as data analysis, abstract models, and algorithmic thinking in exploring and finding solutions.*
- b) Students collect data or identify relevant data sets, use digital tools to analyze them, and represent data in various ways to facilitate problem-solving and decision-making.*
- c) Students break problems into component parts, extract key information, and develop descriptive models to understand complex systems or facilitate problem-solving.*

d) Students understand how automation works and use algorithmic thinking to develop a sequence of steps to create and test automated solutions.

6. Creative Communicator- *Students communicate clearly and express themselves creatively for a variety of purposes using platforms, tools, styles, formats, and digital media appropriate for their goals.*

a) Students choose the appropriate platforms and tools for meeting the desired objectives of their creation or communication.

b) Students create original works or responsibly repurpose or remix digital resources into new creations.

c) Students communicate complex ideas clearly and effectively by creating or using a variety of digital objects such as visualizations, models, or simulations.

d) Students publish or present content that customizes the message and medium for their intended audiences.

7. Global Collaborator- *Students use digital tools to broaden their perspectives and enrich their learning by collaborating with others and working effectively in teams locally and globally.*

a) Students use digital tools to connect with learners from a variety of backgrounds and cultures, engaging with them in ways that broaden mutual understanding and learning.

b) Students use collaborative technologies to work with others, including peers, experts, or community members, to examine issues and problems from multiple viewpoints.

c) Students contribute constructively to project teams, assuming various roles and responsibilities to work effectively toward a common goal.

d) Students explore local and global issues and use collaborative technologies to work with others to investigate solutions.