

**Arkansas Department of Career Education  
Model Framework**

**Course Title: Diesel Electrical Systems**

<b>Secondary – Skilled and Technical Sciences</b>	
Course Number	494660
Career Cluster	Transportation, Distribution & Logistics
CIP Number	470605
Grade Level	10-12
Prerequisite	
Course Type	Core
Teacher Certification	574 Diesel Mechanics
CTSO	Skills USA
Facility Requirements	
Industry Certifications	Automotive Standard of Excellence (ASE)

**Course Description**

This course introduces the student to the knowledge base and technical skills for concepts in diesel electrical systems. Areas of study include basic heavy-truck electrical theory, engine and truck wiring circuits, storage batteries, diesel electrical system testing, and student organizations. Emphasis will be placed on career exploration, job seeking skills, and personal and professional ethics. Safety instruction is integrated into all activities. Students will utilize problem-solving techniques and participate in laboratory activities to develop an understanding of course concepts, and teachers should provide each student with real world learning opportunities and instruction related to diesel equipment technology occupations. Students are encouraged to become active members of SkillsUSA for additional co-curricular opportunities that enhance student achievement, develop student leadership, and support experiential learning.

## **Special Notes**

**For every task in Electrical/Electronic Systems, the following safety task must be strictly enforced: Comply with personal and environmental safety practices associated with clothing; eye protection; hand protection; proper lifting practices; hand tools; power equipment; proper ventilation; and the handling, storage, and disposal of fuels/chemicals/materials in accordance with federal, state, and local regulations.**

**The first task in Electrical/Electronic Systems is to listen to and verify the operator's concern, review past maintenance and repair documents, and determine necessary action.**

<b>Standard 1.0 Demonstrate the employability skills necessary to obtain and maintain employment in the automotive industry.</b>			
<b>Performance Indicator 1.1 Demonstrate personal business etiquette for the automotive industry.</b>	<b>Recommended Application/Activity</b>	<b>CCSS Standards</b>	<b>CCTC Standards</b>
1.1.1 Report to work daily on time; able to take directions and motivated to accomplish the task at hand.	•		
1.1.2 Dress appropriately and use language and manners suitable for the workplace.	•		
1.1.3 Maintain appropriate personal hygiene.	•		
1.1.4 Meet and maintain employment eligibility criteria, such as drug/alcohol-free status, clean driving record, etc.	•		
1.1.5 Demonstrate honesty, integrity and reliability.	•		
<b>Performance Indicator 1.2 Demonstrate personal work ethic and habits.</b>	<b>Recommended Application/Activity</b>	<b>CCSS Standards</b>	<b>CCTC Standards</b>
1.2.1 Comply with workplace policies/laws.	•		
1.2.2 Contribute to the success of the team by assisting others and requesting help when needed.	•		
1.2.3 Identify and address the needs of all customers, providing helpful, courteous and knowledgeable service and advice as needed.	•		
1.2.4 Negotiate solutions to interpersonal and workplace conflicts.	•		
1.2.5 Contribute ideas and initiatives for workplace effectiveness.	•		
1.2.6 Follow directions for shop protocol.	•		
1.2.7 Demonstrate appropriate communication effectively with customers and coworkers.	• (written and verbal)		

1.2.8 Read and interpret workplace policies and procedures.	<ul style="list-style-type: none"> <li>• write clearly and concisely</li> </ul>		
1.2.9 Analyze and resolve problems that arise in completing assigned tasks.	<ul style="list-style-type: none"> <li>•</li> </ul>		
1.2.10 Organize and implement a productive plan of work.	<ul style="list-style-type: none"> <li>•</li> </ul>		
1.2.11 Use technical principles, problem solving and critical thinking skills to accomplish assigned tasks.	<ul style="list-style-type: none"> <li>•</li> </ul>		
<b>Performance Indicator 1.3 Investigate training and entrepreneurial opportunities in the diesel industry.</b>	<b>Recommended Application/Activity</b>	<b>CCSS Standards</b>	<b>CCTC Standards</b>
1.3.1 Evaluate the personal characteristics of a successful professional in the industry.	<ul style="list-style-type: none"> <li>•</li> </ul>		
1.3.2 Identify the training opportunities within the architecture and construction industry.			
1.3.3 Explore extended learning and leadership opportunities in career and technical education student organizations.	<ul style="list-style-type: none"> <li>• Find and participate in the appropriate competition in Skills USA</li> </ul>		
1.3.4 Examine work-based learning opportunities for students in the industry.			
1.3.5 Locate in-demand career opportunities within a chosen region of the state.	<ul style="list-style-type: none"> <li>• Research the pay, education, and diversity of the jobs in the construction industry</li> </ul>	SL11-12.3	AC4
1.3.6 Demonstrate the ability to apply for employment within the industry.	<ul style="list-style-type: none"> <li>• Build a resume on computer and email to the instructor</li> <li>• Create a memo and email to the instructor</li> </ul>	SL11-12.1 W11-12.6	AC7
<b>Standard 2.0 Demonstrate personal and shop safety measures.</b>			
<b>Performance Indicator 2.1 Identify general shop safety rules and procedures.</b>	<b>Recommended Application/Activity</b>	<b>CCSS Standards</b>	<b>CCTC Standards</b>
2.1.1 Locate and demonstrate knowledge of material safety data sheets (MSDS).	<ul style="list-style-type: none"> <li>•</li> </ul>		
2.1.2 Explain purposes for marked safety areas.	<ul style="list-style-type: none"> <li>•</li> </ul>		

2.1.3 Identify the location and use of eye wash stations.	•		
2.1.4 Identify the location of the posted evacuation routes.	•		
2.1.5 Identify and wear appropriate clothing for lab/shop activities.	•		
2.1.6 Utilize proper ventilation procedures for working within the lab/shop area.	•		
2.1.7 Secure hair and jewelry for lab/shop activities.	•		
2.1.8 Comply with the required use of safety glasses, ear protection, gloves, and shoes during lab/shop activities.	•		
2.1.9 Demonstrate knowledge of the procedures for using fire extinguishers and other fire safety equipment.	•		
<b>Performance Indicator 2.2 Utilize safe procedures for handling of tools.</b>	<b>Recommended Application/Activity</b>	<b>CCSS Standards</b>	<b>CCTC Standards</b>
2.2.1 Demonstrate safe handling and use of automotive tools.	•		
2.2.2 Demonstrate proper cleaning, storage, and maintenance of tools and equipment.	•		
<b>Performance Indicator 2.3 Demonstrate knowledge of the procedures for using safety equipment.</b>	<b>Recommended Application/Activity</b>	<b>CCSS Standards</b>	<b>CCTC Standards</b>
2.3.1 Identify and use proper placement of floor jacks and jack stands.	•		
2.3.2 Identify and use proper procedures for safe lift operation.	•		
2.3.3 Demonstrate awareness of the safety aspects of supplemental restraint systems (SRS), electronic brake control systems, and hybrid vehicle high voltage circuits.	•		
2.3.4 Demonstrate awareness of the safety	•		

aspects of high voltage circuits (such as high intensity discharge (HID) lamps, ignition systems, injection systems, etc.).			
<b>Performance Indicator 2.4 Demonstrate knowledge of engine safety.</b>	<b>Recommended Application/Activity</b>	<b>CCSS Standards</b>	<b>CCTC Standards</b>
2.4.1 Check engine starting/operation (including unusual noises, vibrations, exhaust smoke, etc.); record idle and governed rpm.	<ul style="list-style-type: none"> <li>• Perform an under hood inspection and record findings;                             <ul style="list-style-type: none"> <li>▪ Engine starting operation</li> <li>▪ Fluid levels</li> <li>▪ Engine appearance</li> <li>▪ Wiring harness</li> </ul> </li>   <li>• GROUP ACTIVITY: Identify parts of the engine following instructor demonstration.</li> </ul>		
2.4.2 Inspect vibration damper.			
2.4.3 Inspect belts, tensioners, and pulleys; check and adjust belt tension; check belt alignment.			
2.4.4 Check engine oil level and condition; check dipstick seal.			
2.4.5 Inspect engine mounts for looseness and deterioration.			
2.4.6 Check engine for oil, coolant, air, fuel, and exhaust leaks (Engine Off and Running).			
2.4.7 Check engine compartment wiring harnesses, connectors, and seals for damage and proper routing.			
<b>Standard 3.0 Demonstrate knowledge and application of vehicle maintenance and repair preparation.</b>			
<b>Performance Indicator 3.1 Demonstrate appropriate use of diesel electrical systems service tools.</b>	<b>Recommended Application/Activity</b>	<b>CCSS Standards</b>	<b>CCTC Standards</b>
3.1.1 Identify tools and their usage in electrical systems applications.	•		
3.1.2 Identify standard and metric designation.	•		
3.1.3 Demonstrate proper use of precision measuring tools (i.e. micrometer, dial-indicator, dial-caliper).	•		

<b>Performance Indicator 3.2</b> <b>Demonstrate the ability to prepare the vehicle for service.</b>	<b>Recommended Application/Activity</b>	<b>CCSS Standards</b>	<b>CCTC Standards</b>
3.2.1 Identify information needed and the service requested on a repair order.	<ul style="list-style-type: none"> <li>•</li> </ul>		
3.2.2 Demonstrate proper use of fender covers, and mats.	<ul style="list-style-type: none"> <li>•</li> </ul>		
3.3.3 Demonstrate awareness of customer expectations for vehicle repair.	<ul style="list-style-type: none"> <li>• Customer concern, cause, and correction</li> </ul>		
<b><i>Standard 4.0 Inspect, analyze, test, and replace general diesel electrical systems.</i></b>			
<b>Performance Indicator 4.1</b> <b>Demonstrate the ability to inspect, analyze and test electrical systems.</b>	<b>Recommended Application/Activity</b>	<b>CCSS Standards</b>	<b>CCTC Standards</b>
4.1.1 Read and interpret electrical/electronic circuits using wiring diagrams.	<ul style="list-style-type: none"> <li>•</li> </ul>		
4.1.2 Check continuity in electrical/electronic circuits using appropriate test equipment.	<ul style="list-style-type: none"> <li>•</li> </ul>		
4.1.3 Check applied voltages, circuit voltages, and voltage drops in electrical/electronic circuits using appropriate test equipment	<ul style="list-style-type: none"> <li>•</li> </ul>		
4.1.4 Check current flow in electrical/electronic circuits and components using appropriate test equipment.	<ul style="list-style-type: none"> <li>•</li> </ul>		
4.1.5 Check resistance in electrical/electronic circuits and components using appropriate test equipment.	<ul style="list-style-type: none"> <li>•</li> </ul>		
4.1.6 Locate shorts, grounds, and opens in electrical/electronic circuits.	<ul style="list-style-type: none"> <li>•</li> </ul>		
4.1.7 Identify parasitic (key-off) battery drain problems; perform tests; determine	<ul style="list-style-type: none"> <li>•</li> </ul>		

needed action.			
4.1.8 Inspect and test fusible links, circuit breakers, relays, solenoids, and fuses; replace as needed.	•		
4.1.9 Inspect and test spike suppression devices; replace as needed.	•		
4.1.10 Check frequency and pulse width signal in electrical/electronic circuits using appropriate test equipment.	•		
<b>Performance Indicator 4.2 Demonstrate the ability to inspect, analyze and test the starting system.</b>	<b>Recommended Application/Activity</b>	<b>CCSS Standards</b>	<b>CCTC Standards</b>
4.2.1 Perform starter circuit cranking voltage and voltage drop tests; determine needed action.	•		
4.2.2 Inspect and test components (key switch, push button and/or magnetic switch) and wires and harnesses in the starter control circuit; replace as needed.	•		
4.2.3 Inspect and test, starter relays and solenoids/switches; replace as needed.	•		
4.2.4 Remove and replace starter; inspect flywheel ring gear or flex plate.	•		
<b>Performance Indicator 4.3 Demonstrate the ability to inspect, test and repair the charging system.</b>	<b>Recommended Application/Activity</b>	<b>CCSS Standards</b>	<b>CCTC Standards</b>
4.3.1 Test instrument panel mounted volt meters and/or indicator lamps; determine needed action.	•		
4.3.2 Identify causes of a no charge, low charge, or overcharge problems; determine needed action.	•		
4.3.3 Inspect and replace alternator drive belts, pulleys, fans, tensioners, and mounting brackets; adjust drive belts and check alignment.	•		

4.3.4 Perform charging system voltage and amperage output tests; perform AC ripple test; determine needed action.	•		
4.3.5 Perform charging circuit voltage drop tests; determine needed action.	•		
4.3.6 Remove and replace alternator.	•		
4.3.7 Inspect, repair, or replace cables, wires, and connectors in the charging circuit.	•		
<b>Performance Indicator 4.4 Demonstrate the ability to inspect, analyze and test the lighting systems.</b>	<b>Recommended Application/Activity</b>	<b>CCSS Standards</b>	<b>CCTC Standards</b>
4.4.1 Interface with vehicle's on-board computer; perform diagnostic procedures using recommended electronic service tool(s) and determine needed action.	• Including PC based software and/or data scan tools		
4.4.2 Identify causes of brighter than normal, intermittent, dim, or no headlight and daytime running light (DRL) operation.	•		
4.4.3 Test, aim, and replace headlights.	•		
4.4.4 Test headlight and dimmer circuit switches, relays, wires, terminals, connectors, sockets, and control components/modules; repair or replace as needed.	•		
4.4.5 Inspect and test switches, bulbs/LEDs, sockets, connectors, terminals, relays, wires, and control components/modules of parking, clearance, and taillight circuits; repair or replace as needed.	•		
4.4.6 Inspect and test instrument panel light circuit switches, relays, bulbs/LEDs, sockets, connectors, terminals, wires, and printed circuits/control modules; repair or replace as needed.	•		

<p>4.4.7 Inspect and test interior cab light circuit switches, bulbs/LEDs, sockets, low voltage disconnect (LVD), connectors, terminals, wires, and control components/modules; repair or replace as needed.</p>	<ul style="list-style-type: none"> <li>•</li> </ul>		
<p>4.4.8 Inspect and test tractor-to-trailer multi-wire connector(s); repair or replace as needed.</p>	<ul style="list-style-type: none"> <li>•</li> </ul>		
<p>4.4.9 Inspect, test, and adjust stoplight circuit switches, bulbs/LEDs, sockets, connectors, terminals, wires and control components/modules; repair or replace as needed.</p>	<ul style="list-style-type: none"> <li>•</li> </ul>		
<p>4.4.10 Inspect and test turn signal and hazard circuit flasher(s), switches, relays, bulbs/LEDs, sockets, connectors, terminals, wires and control components/modules; repair or replace as needed.</p>	<ul style="list-style-type: none"> <li>•</li> </ul>		
<p>4.4.11 Inspect and test reverse lights and warning device circuit switches, bulbs/LEDs, sockets, horns, buzzers, connectors, terminals, wires and control components/modules; repair or replace as needed.</p>	<ul style="list-style-type: none"> <li>•</li> </ul>		
<p><b>Performance Indicator 4.5 Demonstrate the ability to inspect, analyze and test the gauges and warning devices.</b></p>	<p><b>Recommended Application/Activity</b></p>	<p><b>CCSS Standards</b></p>	<p><b>CCTC Standards</b></p>
<p>4.5.1 Interface with vehicle’s on-board computer; perform diagnostic procedure, verify instrument cluster operations using recommended electronic service tool(s) (including PC based software and/or data scan tools); determine needed action.</p>	<ul style="list-style-type: none"> <li>•</li> </ul>		

4.5.2 Identify causes of intermittent, high, low, or no gauge readings; determine needed action.	•		
4.5.3 Identify causes of data bus-driven gauge malfunctions; determine needed action.	•		
4.5.4 Inspect and test gauge circuit sensor/sending units, gauges, connectors, terminals, and wires; repair or replace as needed.	•		
4.5.5 Inspect and test warning devices (lights and audible) circuit sensor/sending units, bulbs/LEDs, sockets, connectors, wires, and control components/modules; repair or replace as needed.	•		
4.5.6 Inspect, test, replace, and calibrate (if applicable) electronic speedometer, odometer, and tachometer systems.	•		
<b>Performance Indicator 4.6 Demonstrate the ability to inspect, analyze and test related electrical systems.</b>	<b>Recommended Application/Activity</b>	<b>CCSS Standards</b>	<b>CCTC Standards</b>
4.6.1 Interface with vehicle's on-board computer; perform diagnostic procedures using recommended electronic service tool(s) (including PC based software and/or data scan tools); determine needed action.			
4.6.2 Identify causes of constant, intermittent, or no horn operation; determine needed action.	•		
4.6.3 Inspect and test horn circuit relays, horns, switches, connectors, wires, clock springs, and control components/modules; repair or replace as needed.	•		
4.6.4 Identify causes of constant,	•		

intermittent, or no wiper operation; diagnose the cause of wiper speed control and/or park problems; determine needed action.			
4.6.5 Inspect and test wiper motor, resistors, park switch, relays, switches, connectors, wires and control components/modules; repair or replace as needed.	•		
4.6.6 Inspect wiper motor transmission linkage, arms, and blades; adjust or replace as needed.	•		
4.6.7 Inspect and test windshield washer motor or pump/relay assembly, switches, connectors, terminals, wires, and control components/modules; repair or replace as needed.	•		
4.6.8 Inspect and test side view mirror motors, heater circuit grids, relays, switches, connectors, terminals, wires and control components/modules; repair or replace as needed.	•		
4.6.9 Inspect and test heater and A/C electrical components including: A/C clutches, motors, resistors, relays, switches, connectors, terminals, wires, and control components/modules; repair or replace as needed.	•		
4.6.10 Inspect and test auxiliary power outlet, integral fuse, connectors, terminals, wires, and control components/modules; repair or replace as needed.	•		
4.6.11 Identify causes of slow, intermittent, or no power window operation; determine needed action.	•		
4.6.12 Inspect and test motors, switches,	•		

relays, connectors, terminals, wires, and control components/modules of power window circuits; repair or replace as needed.			
4.6.13 Inspect and test block heaters; determine needed repairs.	•		
4.6.14 Inspect and test cruise control electrical components; repair or replace as needed.	•		
4.6.15 Inspect and test switches, relays, controllers, actuator/solenoids, connectors, terminals, and wires of electric door lock circuits.	•		
4.6.16 Check operation of keyless and remote lock/unlock devices; determine needed action.	•		
4.6.17 Inspect and test engine cooling fan electrical control components/modules, wiring; repair or replace as needed.	•		
4.6.18 Identify causes of data bus communication problems; determine needed action.	•		
<b>Performance Indicator 4.7 Demonstrate the ability to inspect, analyze and test the battery and starting systems.</b>	<b>Recommended Application/Activity</b>	<b>CCSS Standards</b>	<b>CCTC Standards</b>
4.7.1 Inspect battery box(es), cover(s), and mountings.	•		
4.7.2 Inspect battery hold-downs, connections, cables, and cable routing; service as needed.	•		
4.7.3 Check/record battery state-of-charge (open circuit voltage) and condition.	•		
4.7.4 Perform battery test (load and/or capacitance).	•		

4.7.5 Inspect starter, mounting, and connections.	•		
4.7.6 Engage starter; check for unusual noises, starter drag, and starting difficulty.	•		
<b>Performance Indicator 4.8 Demonstrate the ability to inspect, analyze and test instruments and controls.</b>	<b>Recommended Application/Activity</b>		<b>CCSS Standards</b>
4.8.1 Inspect key condition and operation of ignition switch.	•		
4.8.2 Check warning indicators.	•		
4.8.3 Check instruments; record oil pressure and system voltage.	•		
4.8.4 Check operation of electronic power take off (PTO) and engine idle speed controls (if applicable).	•		
4.8.5 Check HVAC controls.	•		
4.8.6 Check operation of all Using electronic service tool(s) or on-board diagnostic system; retrieve engine monitoring information; check and record diagnostic codes and trip/operational data (including engine, transmission, ABS, and other systems).accessories.	•		

## Common Core State Standards Grades 9-10

### ELA Speaking and Listening Standards Grades 9-10

1. Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 9–10 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively. **SL9-10.1**
  - a. Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas. **SL9-10.1a**
  - b. Work with peers to set rules for collegial discussions and decision-making (e.g., informal consensus, taking votes on key issues, presentation of alternate views), clear goals and deadlines, and individual roles as needed. **SL9-10.1b**
  - c. Propel conversations by posing and responding to questions that relate the current discussion to broader themes or larger ideas; actively incorporate others into the discussion; and clarify, verify, or challenge ideas and conclusions. **SL9-10.1c**
  - d. Respond thoughtfully to diverse perspectives, summarize points of agreement and disagreement, and, when warranted, qualify or justify their own views and understanding and make new connections in light of the evidence and reasoning presented. **SL9-10.1d**
2. Integrate multiple sources of information presented in diverse media or format(e.g., visually, quantitatively, orally) evaluating the credibility and accuracy of each source. **SL9-10.2**
3. Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, identifying any fallacious reasoning or exaggerated or distorted evidence. **SL9-10.3**
4. Present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task. **SL9-10.4**
5. Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest. **SL9-10.5**

### ELA Language Grades 9-10

4. Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grades 9–10 reading and content, choosing flexibly from a range of strategies. **L9-10.4**
  - a. Use context (e.g., the overall meaning of a sentence, paragraph, or text; a word's position or function in a sentence) as a clue to the meaning of a word or phrase. **L9-10.4a**
  - b. Identify and correctly use patterns of word changes that indicate different meanings or parts of speech (e.g., analyze, analysis, analytical; advocate, advocacy). **L9-10.4b**

- c. Consult general and specialized reference materials (e.g., dictionaries, glossaries, thesauruses), both print and digital, to find the pronunciation of a word or determine or clarify its precise meaning, its part of speech, or its etymology. **L9-10.4c**
  - d. Verify the preliminary determination of the meaning of a word or phrase (e.g., by checking the inferred meaning in context or in a dictionary). **L9-10.4d**
6. Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression. **L9-10.6**

### **Reading Standards for Literacy in Science and Technical Subjects Grades 9-10**

1. Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions. **R9-10.1**
2. Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. **R9-10.2**
3. Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. **R9-10.3**
4. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics. **R9-10.4**
5. Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy). **R9-10.5**
6. Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address. **R9-10.6**
7. Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. **R9-10.7**
8. Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem. **R9-10.8**
9. Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts. **R9-10.9**
10. By the end of grade 10, read and comprehend science/technical texts in the grades 9–10 text complexity band independently and proficiently. **R9-10.10**

## Writing Standards for Literacy in History/Social Studies, Science, and Technical Subjects Grades 9-10

1. Write arguments focused on discipline-specific content. **W9-10.1**
  - a. Introduce precise claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that establishes clear relationships among the claim(s), counterclaims, reasons, and evidence. **W9-10.1a**
  - b. Develop claim(s) and counterclaims fairly, supplying data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form and in a manner that anticipates the audience's knowledge level and concerns. **W9-10.1b**
  - c. Use words, phrases, and clauses to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims. **W9-10.1c**
  - d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. **W9-10.1d**
  - e. Provide a concluding statement or section that follows from or supports the argument presented. **W9-10.1e**
2. Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. **W9-10.2**
  - a. Introduce a topic and organize ideas, concepts, and information to make important connections and distinctions; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension. **W9-10.2a**
  - b. Develop the topic with well-chosen, relevant, and sufficient facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic. **W9-10.2b**
  - c. Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among ideas and concepts. **W9-10.2c**
  - d. Use precise language and domain-specific vocabulary to manage the complexity of the topic and convey a style appropriate to the discipline and context as well as to the expertise of likely readers. **W9-10.2d**
  - e. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. **W9-10.2e**
  - f. Provide a concluding statement or section that follows from and supports the information or explanation presented (e.g., articulating implications or the significance of the topic). **W9-10.2f**
3. Write precise enough descriptions of the step-by-step procedures they use in their investigations or technical work that others can replicate them and (possibly) reach the same results. **W9-10.3**
4. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. **W9-10.4**
5. Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. **W9-10.5**
6. Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically. **W9-10.6**

7. 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; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. **W9-10.7**
8. Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation. **W9-10.8**
9. Draw evidence from informational texts to support analysis, reflection, and research. **W9-10.9**
10. Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. **W9-10.10**

## **Common Career and Technical Core Standards**

### ***Transportation, Distribution, & Logistics Career Cluster***

#### **Transportation, Distribution, & Logistics Career Cluster Standards (TD)**

1. Describe the nature and scope of the Transportation, Distribution, and Logistics Career Cluster and the role of transportation, distribution and logistics in society and the economy. **TD1**
2. Describe the application and use of new and emerging advanced techniques to provide solutions for transportation, distribution, and logistics problems. **TD2**
3. Describe key operational activities required of successful transportation, distribution, and logistics facilities. **TD3**
4. Identify governmental policies and procedures for transportation, distribution, and logistics facilities. **TD4**
5. Describe transportation, distribution, and logistics employee rights and responsibilities and employers' obligations concerning occupational safety and health. **TD5**
6. Describe career opportunities and means to achieve those opportunities in each of the Transportation, Distribution, and Logistics Career Pathways. **TD6**

#### **Facility and Mobile Equipment Maintenance Career Pathway (TD-MTN)**

1. Develop preventative maintenance plans and systems to keep facility and mobile equipment inventory in operation. **TD-MTN1**
2. Design ways to improve facility and equipment system performance. **TD-MTN2**

#### ***Common Career and Technical Core Career Ready Practices (CCTC CRP)***

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| 1. Act as a responsible and contributing citizen and employee. <b>CRP1</b>           | 7. Employ valid and reliable research strategies. <b>CRP7</b>                                     |
| 2. Apply appropriate academic and technical skills. <b>CRP2</b>                      | 8. Utilize critical thinking to make sense of problems and persevere in solving them. <b>CRP8</b> |
| 3. Attend to personal health and financial well-being. <b>CRP3</b>                   | 9. Model integrity, ethical leadership, and effective management. <b>CRP9</b>                     |
| 4. Communicate clearly, effectively, and with reason. <b>CRP4</b>                    | 10. Plan education and career path aligned to personal goals. <b>CRP10</b>                        |
| 5. Consider the environmental, social and economic impacts of decisions. <b>CRP5</b> | 11. Use technology to enhance productivity. <b>CRP11</b>  |
| 6. Demonstrate creativity and innovation. <b>CRP6</b>                                | 12. Work productively in teams while using cultural/global competence. <b>CRP12</b>               |