Arkansas Department of Career Education
Model Framework

Course Title: **Nonstructural Analysis/Repair**

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

Secondary – Skilled and Technical Sciences		
Course Number	494300	
CIP Number	47.0603	
Grade Level	9-12	
Prerequisite	None	
Course Type	Core	
Teacher Certification	567	
CTSO	SKILLS	SKILLS
Facility Requirements	http://arkansasfacilities.arkansas.gov/facilities/academic-facilities-manual	
Industry Certifications	www.asestudentcertification.com/	

Course Description

This class is designed to provide the student the opportunity to practice the skills of non-structural repair of the vehicle. Students will learn how to straighten metal body parts; repair plastic and composite parts and replace hoods, bumpers, fenders, grilles, and deck lids.

Program Purpose/Structure

The curriculum content framework Collision Repair Technology supports the course that prepares students for the following career roles, which in turn correspond to the CIP (Classification of Instructional Programs) codes listed below. The courses may be sequenced with a variety of career and technical courses to form a specialization to prepare students for careers and support additional education and training in the protective services industry. The Transportation cluster of

programs prepares students for careers in automotive service and repair, aviation maintenance, diesel equipment maintenance and repair, and small engine repair.
Programs within the Transportation cluster are listed as follows:
• Auto Body Technology — Certified
• Auto Body Repair — Non-Certified
• Automotive Service Technology — Certified
• Automotive Servicing — Non-Certified
• Aviation Maintenance Technology
• Diesel Equipment Technology
• Power Equipment Technology
• Career Role CIP Code – 47.0603
• O-NET 49-3021.XX

Laboratory Activities

Special Notes

Career and Technical Student Organization (CTSO)

SkillsUSA

Arkansas Department of Career Education
Student Performance Standards

Course Title: **Nonstructural Analysis/Repair**
Course Number: **494300**
Course Credit: **1**

Nonstructural Analysis/Repair Indicators: At the completion of the course the student will be able to . .

1.0 Demonstrate Appropriate Safety Procedures
- 1.1 Identify and demonstrate safe work practices
- 1.2 Practice personal safety in work areas

2.0 Demonstrate safe usage of tools and equipment
- 2.1 Demonstrate knowledge of shop tools and equipment

3.0 Practice Employability/Leadership Skills
- 3.1 Demonstrate employability skills
- 3.2 Demonstrate leadership skills

4.0 Demonstrate Repair Procedures of Body Components
- 4.1 Demonstrate damage analysis preparation procedures
- 4.2 Demonstrate outer body panel repairs, replacements, and adjustment procedures
- 4.3 Demonstrate metal finishing and body filling repair procedures
- 4.4 Demonstrate moveable glass and hardware repair procedures
- 4.5 Demonstrate the use of plastics and adhesives for body repair

5.0 Preparing Vehicle for Service/Customer
- 5.1 Prepare vehicle for service as listed on the work order
- 5.2 Prepare vehicle for customer

Standard 1.0 Demonstrate Appropriate Safety Procedures			
Performance Indicator 1.1 **Identify and demonstrate safe work practices.**	• **Recommended Application/Activity**	**CCSS Standards**	**CCTC Standards**
1.1.1 Identify general shop safety rules and procedures.	• Review and assess understanding of posted shop regulations. Post standard expectations of safe shop practices.	L11-12.4	CRP1
1.1.2 Utilize safe procedures for handling of tools and equipment.	• Demonstrate proficiency with tools and equipment before performing tasks with them.	L11-12.4	CRP2
1.1.3 Identify and use proper placement of floor jacks and jack stands.	• Research service information for proper procedure. • Demonstrate proficiency in using floor jacks and jack stands before lifting vehicle.	R11-12.1	CRP11
1.1.4 Identify and use proper procedures for safe lift operation.	• Locate and understand lift manufacturer safety information on lift tag. Refer to service manual for proper lifting points. Demonstrate proficiency operating lift.	L11-12.4	CRP11
1.1.5 Utilize proper ventilation procedures for working within the lab/shop area.	• Locate and identify ventilation system for shop. • Identify and demonstrate proper use of ventilation procedure. • Write paragraph on dangers of asphyxiation.	W11-12.2	CRP3
1.1.6 Identify marked safety areas.	• Locate and identify different marked areas in shop. Demonstrate understanding of purpose of marked areas. • Draw diagram of marked areas in the shop.	SL11-12.5	CRP2 CRP3
1.1.7 Identify the location and the types of fire extinguishers and other fire safety equipment; demonstrate knowledge of the procedures for using fire extinguishers and other fire safety equipment.	• Identify and locate fire extinguishers in shop. • Pass a fire safety test. • Review evacuation plan and where it is located in the building.	SL11-12.2	CRP3
Performance Indicator 1.2 **Practice personal safety in work areas.**	• **Recommended Application/Activity**	**CCSS Standards**	**CCTC Standards**

1.2.1 Identify the location and use of eye wash stations.	• • Pass a safety procedure test. • • Label eye station on diagram of shop.	SL11-12.2	CRP3
1.2.2 Identify the location of the posted evacuation routes.	• • Pass a safety procedure test. • • Label location of evacuation route on diagram of shop.	SL11-12.2	CRP3
1.2.3 Comply with the required use of safety glasses, ear protection, gloves, and shoes during lab/shop activities.	• Demonstrate the proper usage of personal protective equipment (PPE). Have rules posted including consequences of noncompliance.	SL11-12.2 R11-12.7	CRP3 TD5
1.2.4 Identify and wear appropriate clothing for lab/shop activities.	• Demonstrate appropriate dress before working in shop. Have rules posted and logical consequences for noncompliance.	SL11-12.2 R11-12.7	CRP3
1.2.5 Secure hair and jewelry for lab/shop activities.	• Find hair and jewelry safety violation with other students.	SL11-12.2 R11-12.7	CRP3 CRP4
1.2.6 Demonstrate awareness of the safety aspects of supplemental restraint systems (SRS), electronic brake control systems, and hybrid vehicle high voltage circuits.	• Identify areas of possible danger, show video or demonstrate air bag deployment. • Emphasize the importance of correctly identifying the yellow and orange circuits.	SL11-12.2 R11-12.7 R11-12.6	CRP3 CRP5 CRP11
1.2.7 Demonstrate awareness of the safety aspects of high voltage circuits (such as high intensity discharge (HID) lamps, ignition systems, injection systems, etc.).	• Identify areas of possible danger. • Have a live demonstration of a volunteer being tazed by security office so they will understand the shock hazard.	SL11-121d	CRP1 CRP12
1.2.8 Locate and demonstrate knowledge of safety data sheets (SDS).	• Location of SDS included in safety test. • Identify chemicals and pull up and print SDS sheets on chemicals in the lab area.	R11-12.3	CRP11 CRP7

Standard 2.0 Demonstrate Safe Usage of Tools and Equipment			
Performance Indicator 2.1 Demonstrate knowledge of shop tools and equipment.	**Recommended Application/Activity**	**CCSS Standards**	**CCTC Standards**
2.1.1 Identify tools and their usage in automotive applications.	• Tool identification exercises. To include hand outs and spot quizzes.	R11-12.4	TD2
2.1.2 Identify standard and metric designation.	• Review and identify common tool sizes.	R11-12.4 L11-12.6	TD2
2.1.3 Demonstrate safe handling and use of appropriate tools.	• Safely handle and use appropriate tools	R11-12.4 L11-12.6	CRP1 CRP3
2.1.4 Demonstrate proper cleaning, storage, and maintenance of tools and equipment.	• Demonstrate proficiency in cleaning and storing tools	R11-12.4 L11-12.6	CRP12

Tools:

http://www.onguardsafetytraining.com/samples/2Automotive%20Hand%20tools.pdf

SAE/Metric:

http://www.sosmath.com/tables/sae/sae.html

http://www.hondachopper.com/garage/sae_to_metric/SAE-Metric_Conversion_Chart.pdf

http://www.engineeringtoolbox.com/wrenches-inches-metric-us-conversion-comparison-d_1607.html

Standard 3.0 Practice Employability/Leadership Skills			
Performance Indicator 3.1 Demonstrate employability skills.	**Recommended Application/Activity**	**CCSS Standards**	**CCTC Standards**
3.1.1 Demonstrate a good work ethic (i.e., relations with other, dependability, attitude, and personal hygiene).	• Use guest speakers from industry. • Utilize career coaches to model appropriate behavior and attitude.	SL11-12.1	TD1 CRP1
3.1.2 Demonstrate teamwork.	• Assign paired work placing students in work groups with rotating roles.	SL11-12.1b	CRP1 CRP12
3.1.3 Demonstrate job-seeking techniques (i.e., write a resume, search for a job, arrange references, and apply interview techniques)	• Write resume. Have career coach assist in resume building. • Perform mock interview • Complete a job application	W11-12.5 W11-12.6	CRP10
3.1.4 Describe legal issues of sexual harassment in the workplace.	• Sexual harassment seminar. Invite guest speakers.	SL11-12.3	CRP5
3.1.5 Identify employment eligibility requirements (e.g. valid driver's license, background check etc.)	• Guest speaker for job requirements. • Review job opening requirements.	SL11-12.3	TD5
Performance Indicator 3.2 Demonstrate leadership skills.	**Recommended Application/Activity**	**CCSS Standards**	**CCTC Standards**
3.2.1 Perform basic parliamentary procedures in a group meeting.	• Have class meetings following Robert Rules of Order	SL11-12.1b	CRP9
3.2.2 Demonstrate an understanding of one's personal values, interpersonal skills, etiquette, effectiveness in oral and written communication and courtesy. Develop and maintain a code of professional ethics.	• • Perform self-evaluation • • Use a professional development manual • Practice communication exercises • Practice writing examples, role-play conflict resolution scenarios	SL11-12.1b	CRP4 CRP9
3.2.3 Maintain a good professional appearance.	• Counsel students on importance of maintaining a positive image • Invite industry representatives to discuss employment standards	SL11-12.3	CRP3

3.2.4 Perform basic tasks related to securing and terminating employees.	• Perform mock interviews. • Evaluate employee performance and simulate terminations.	SL11-12.3	CRP9 TD5

Standard 4.0 Demonstrate Repair Procedures of Body Components			
Performance Indicator 4.1 Demonstrate damage analysis preparation procedures.	**Recommended Application/Activity**	**CCSS Standards**	**CCTC Standards**
4.1.1 Review damage report and analyze damage to determine appropriate methods for overall repair; develop and document a repair plan.	• Read estimate and develop a work order. • Use any collision resource to identify all parts for the repair plan.	R11-12.5 W11-12.3	CRP2 CRP4
4.1.2 Inspect, remove, store, and replace exterior and interior trim and moldings, body panels and components that may interfere with or be damaged during repair and vehicle mechanical and electrical components that may interfere with or be damaged during repair.	• Remove and evaluate condition of all parts necessary for the repair • Contain and label all hardware and fasteners in a systematic order • Store parts in safe location • Replace all new and reusable parts on vehicle	R11-12.5 W11-12.3 L11-12.6	CRP2 CRP8
4.1.3 Protect panels, glass, interior parts, and other vehicles adjacent to the repair area.	• Use blankets, paper, tape, welding shields, welding paper, and any industry approved materials to protect unworked areas on vehicle	R11-12.4	CRP2
4.1.4 Soap and water wash entire vehicle for inspection.	• Demonstrate proper pre-wash and inspect vehicle for repairs	L11-12.6	CRP2
4.1.5 Prepare damaged area using water-based and solvent-based cleaners.	• Demonstrate the use of wax and grease remover or water-based cleaners on damaged areas of a vehicle	L11-12.6	CRP2
4.1.6 Remove corrosion protection, undercoating's, sealers, and other protective coatings as necessary to perform repairs.	• Demonstrate the removal of protective coatings on vehicle prior to making repairs • Explain the importance of each coating	L11-12.6 SL11-12.4	CRP2
Performance Indicator 4.2 Demonstrate outer body panel repairs, replacements, and adjustment procedures.	**Recommended Application/Activity**	**CCSS Standards**	**CCTC Standards**
4.2.1 Determine the extent of direct (primary) and indirect (secondary) damage	• Visually inspect damage, write report, and write repair plan	R11-12.5 W11-12.3	CRP2 CRP4

and direction of impact; develop and document a repair plan.			
4.2.2 Inspect, remove and replace bolted, bonded, and welded steel panel or panel assemblies.	• Use multimedia or collision related sources	SL11-12.5	CRP2 CRP11
4.2.3 Determine the extent of damage to aluminum body panels; repair or replace.	• Use multimedia or collision related sources	SL11-12.5	CRP2 CRP11
4.2.4 Inspect, remove, replace, and align hood, hood hinges, and hood latch, deck lid, lid hinges, and lid latch, doors, latches, hinges, and related hardware, tailgates, hatches, lift gates and sliding doors, bumper bars, covers, reinforcement, guards, isolators, and mounting hardware, fenders, and related panels.	• Perform individual tasks in logical order on instructor observes ▪ Inspect ▪ Remove parts ▪ Label parts ▪ Replace parts as labeled ▪ Align using appropriate tools and techniques	R11-12.3 L11-12.6	CRP8
4.2.5 Straighten contours of damaged panels to a suitable condition for body filling or metal finishing using power tools, hand tools, and weld-on pulling attachments.	• Work on practice panels until task is preformed proficiently using appropriate tools	R11-12.3	CRP2
4.2.6 Weld damaged or torn steel body panels; repair broken welds.	• Determine industry standards for the use of welding • Use test plates to practice	SL11-12.5 R11-12.3	CRP2 CRP11
4.2.7 Restore corrosion protection.	• Demonstrate proper corrosion protection treatments and their value using various sources	SL11-12.5	CRP2 CRP11
4.2.8 Replace door skins.	• Demonstrate using multimedia and hands on exercises	SL11-12.5	CRP2 CRP11
4.2.9 Restore sound deadeners and foam materials.	• Identify sound deadening materials and foam using multimedia sources	SL11-12.5	CRP2 CRP11
4.2.10 Perform panel bonding.	• Use panel bond to adhere pieces of vehicle together • Use industry demonstrations	R11-12.3	CRP2
4.2.11 Diagnose and repair water leaks, dust leaks, and wind noise.	• Run shop fans—hoses—and when possible, test driving. • Use multimedia and available resources.	SL11-12.5	CRP2 CRP11
4.2.12 Identify one-time fasteners.	• Show examples of fasteners that cannot be reused • Explain difference between reusable and one-time fasteners	L11-12.6	CRP2

Performance Indicator 4.3 **Demonstrate metal finishing and body filling repair procedures.**	**Recommended Application/Activity**	**CCSS Standards**	**CCTC Standards**
4.3.1 Remove paint from the damaged area of a body panel.	• Demonstrate removal of paint in a localized area per manufacturer's recommendation on a panel	L11-12.6	CRP2
4.3.2 Locate and repair surface irregularities on a damaged body panel.	• Demonstrate how to locate, diagnose, and repair damage on a panel proficiently	L11-12.6	CRP2
4.3.3 Demonstrate hammer and dolly techniques.	• Demonstrate hammer-on and hammer-off techniques using selected hammers and dollies on a panel	L11-12.6	CRP2
4.3.4 Heat shrink stretched panel areas to proper contour.	• Demonstrate by multimedia or collision related materials emphasizing industry standards	L11-12.6	CRP2 CRP11
4.3.5 Cold shrink stretched panel areas to proper contour.	• Use multimedia and collision related material to show cold shrinking methods on a stretched panel. • Demonstrate in the shop/lab using shrinking hammers and dollies	SL11-12.5 L11-12.6	CRP2 CRP11
4.3.6 Mix and apply body filler.	• Demonstrate mixing and application of various types of fillers and putties to a dented panel	L11-12.6	CRP2
4.3.7 Identify different types of body fillers.	• Demonstrate identification of various types of fillers and putties to a dented panel	L11-12.6	CRP2
4.3.8 Rough sand body filler to contour; finish sand.	• Demonstrate finishing techniques by sanding on applied filler	L11-12.6	CRP2
4.3.9 Determine the proper metal finishing techniques for aluminum.	• Use multimedia and collision related material to show aluminum finishing techniques.	SL11-12.5 L11-12.6	CRP2 CRP11
4.3.10 Determine proper application of body filler to aluminum.	• Use multimedia and collision related material to show the proper application of body filler to aluminum. • Explain the correct type of fillers for aluminum.	SL11-12.5 L11-12.6	CRP2 CRP11
Performance Indicator 4.4 **Demonstrate moveable glass and hardware repair procedures.**	**Recommended Application/Activity**	**CCSS Standards**	**CCTC Standards**
4.4.1 Inspect, adjust, repair or replace window regulators, run channels, glass, power mechanisms, and related controls.	• Perform individual tasks in logical order on vehicle as instructor observes ▪ Inspect ▪ Remove parts ▪ Label parts ▪ Replace parts as labeled	R11-12.3 L11-12.6	CRP2

4.4.2 Inspect, adjust, repair, remove, reinstall or replace weather-stripping.	• Perform task in logical order as instructor observes	R11-12.3	CRP2
4.4.3 Inspect, repair or replace, and adjust removable power operated roof panel and hinges, latches, guides, handles, retainer, and controls of sunroofs.	• Use multimedia and collision related material to show proper industry procedures for removal and installation of power roof panels, hinges, latches, guides, handles, retainer and controls of sunroofs	SL11-12.5	CRP2 CRP11
4.4.4 Inspect, remove, reinstall, and align convertible top and related mechanisms.	• Use multimedia and collision related material to show proper industry procedures for removal and installation of convertible tops and related mechanisms	SL11-12.5	CRP2 CRP11
4.4.5 Initialize electrical components as needed.	• Perform individual tasks in logical order on vehicle as instructor observes	R11-12.3	CRP2
Performance Indicator 4.5 Demonstrate the use of plastics and adhesives for body repair.	**Recommended Application/Activity**	**CCSS Standards**	**CCTC Standards**
4.5.1 Identify the types of plastics; determine reparability.	• Use test plates to show different types of plastic and demonstrate reparability	L11-12.6	CRP2
4.5.2 Inspect, remove, and reinstall repairable plastics and other components for off-vehicle repair.	• Perform individual tasks in logical order on vehicle as instructor observes ▪ Inspect ▪ Remove parts ▪ Label parts ▪ Replace parts as labeled	R11-12.3 L11-12.6	CRP2
4.5.3 Clean and prepare the surface of plastic parts; identify the types of plastic repair procedures.	• Use test plate to show examples of repair techniques	L11-12.6	CRP2
4.5.4 Repair rigid, semi-rigid, or flexible plastic panels.	• Use multimedia and collision related material to show different methods of repair	SL11-12.5	CRP2 CRP11
4.5.5 Remove or repair damaged areas from rigid exterior composite panels.	• Instructors demonstrate how to remove damaged areas from rigid exterior composite panels	L11-12.6	CRP2
4.5.6 Replace bonded rigid exterior composite body panels; straighten or align panel supports.	• Instructors demonstrate how to replace bonded rigid exterior composite body panes; straighten or align panel supports	L11-12.6	CRP2

Standard 5.0 Preparing Vehicle for Service/Customer			
Performance Indicator 5.1 **Prepare vehicle for service as listed on the work order.**	**Recommended Application/Activity**	**CCSS Standards**	**CCTC Standards**
5.1.1 Identify information needed and the service requested on a repair order.	• Write and print repair orders • Explain information on repair orders	SL11-12.1a SL11-12.5 W11-12.8	CRP11
5.1.2 Identify purpose and demonstrate proper use of fender covers, mats.	• Establish a policy of using covers and mats. • Rotate as service writer and install mats and covers	R11-12.2 W11-12.8	CRP2
5.1.3 Demonstrate use of the three C's (concern, cause, and correction).	• List 3 c's on every work order	SL11-12.1b W11-12.8	CRP2
5.1.4 Review vehicle service history.	• Review available service records • Discuss previous repairs and effect on current problem	SL11-12.5	CRP2
5.1.5 Complete work order to include customer information, vehicle identifying information, customer concerns, related service history, cause, and correction.	• Fill out work order on every vehicle • Train student on writing and filling out repair orders	W11-12.2	CRP11 CRP4
Performance Indicator 5.2 **Prepare vehicle for customer.**	**Recommended Application/Activity**	**CCSS Standards**	**CCTC Standards**
5.2.1 Ensure vehicle is prepared to return to customer per school or company policy (floor mats, steering wheel cover, etc.).	• Establish a policy of what is done to a vehicle before it is returned to customer • Clean of grease marks or stains etc. • Car is fixed according to work order	R11-12.2 R11-12.9	CRP11 CRP2

Common Core State Standards Grades 9-12

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 Speaking and Listening Standards Grades 11-12

1. Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 11–12 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively. **SL11-12.1**
   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. **SL11-12.1a**
   b. Work with peers to promote civil, democratic discussions and decision-making, set clear goals and deadlines, and establish individual roles as needed. **SL11-12.1b**
   c. Propel conversations by posing and responding to questions that probe reasoning and evidence; ensure a hearing for a full range of positions on a topic or issue; clarify, verify, or challenge ideas and conclusions; and promote divergent and creative perspectives. **SL11-12.1c**
   d. 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 task. **SL11-12.1d**

2. 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. **SL11-12.2**
3. Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, assessing the stance, premises, links among ideas, word choice, points of emphasis, and tone used. **SL11-12.3**
4. Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks. **SL11-12.4**
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. **SL11-12.5**

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**

ELA Language Grades 11-12

4. Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grades 11–12 reading and content, choosing flexibly from a range of strategies. **L11-12.4**
    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. **L11-12.4a**
    b. Identify and correctly use patterns of word changes that indicate different meanings or parts of speech (e.g., conceive, conception, conceivable). **L11-12.4b**

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, its etymology, or its standard usage. **L11-12.4c**

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 **L11-12.4d**

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. **L11-12.6**

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**

Reading Standards for Literacy in Science and Technical Subjects Grades 11-12

1. Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. **R11-12.1**
2. Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms. **R11-12.2**

3. Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text. **R11-12.3**
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 11–12 texts and topics. **R11-12.4**
5. Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas. **R11-12.5**
6. Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved. **R11-12.6**
7. Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem. **R11-12.7**
8. Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. **R11-12.8**
9. Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. **R11-12.9**
10. By the end of grade 12, read and comprehend science/technical texts in the grades 11–CCR text complexity band independently and proficiently. **R11-12.10**

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**

Writing Standards for Literacy in History/Social Studies, Science, and Technical Subjects Grades 11-12

1. Write arguments focused on discipline-specific content. **W11-12.1**
   a. Introduce precise, knowledgeable claim(s), establish the significance of the claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that logically sequences the claim(s), counterclaims, reasons, and evidence. **W11-12.1a**
   b. Develop claim(s) and counterclaims fairly and thoroughly, supplying the most relevant data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form that anticipates the audience's knowledge level, concerns, values, and possible biases. **W11-12.1b**

c. Use words, phrases, and clauses as well as varied syntax 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. **W11-12.1c**
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. **W11-12.1d**
e. Provide a concluding statement or section that follows from or supports the argument presented. **W11-12.1e**

2. Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. **W11-12.2**
   a. Introduce a topic and organize complex ideas, concepts, and information so that each new element builds on that which precedes it to create a unified whole; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension. **W11-12.2a**
   b. Develop the topic thoroughly by selecting the most significant and relevant facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic. **W11-12.2b**
   c. Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts. **W11-12.2c**
   d. Use precise language, domain-specific vocabulary and techniques such as metaphor, simile, and analogy to manage the complexity of the topic; convey a knowledgeable stance in a style that responds to the discipline and context as well as to the expertise of likely readers. **W11-12.2d**
   e. Provide a concluding statement or section that follows from and supports the information or explanation provided (e.g., articulating implications or the significance of the topic). **W11-12.2e**
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. **W11-12.3**
4. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
   W11-12.4
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. **W11-12.5**
6. 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. **W11-12.6**
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. **W11-12.7**
8. Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the

text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. **W11-12.8**

9. Draw evidence from informational texts to support analysis, reflection, and research. **W11-12.9**
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. **W11-12.10**

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)

1. Act as a responsible and contributing citizen and employee. **CRP1**
2. Apply appropriate academic and technical skills. **CRP2**
3. Attend to personal health and financial well-being. **CRP3**
4. Communicate clearly, effectively, and with reason. **CRP4**
5. Consider the environmental, social and economic impacts of decisions. **CRP5**
6. Demonstrate creativity and innovation. **CRP6**
7. Employ valid and reliable research strategies. **CRP7**

8. Utilize critical thinking to make sense of problems and persevere in solving them. **CRP8**
9. Model integrity, ethical leadership, and effective management. **CRP9**
10. Plan education and career path aligned to personal goals.**CRP10**
11. Use technology to enhance productivity. **CRP11**
12. Work productively in teams while using cultural/global competence. **CRP12**