COLTON REDLANDS YUCAIPA
REGIONAL OCCUPATIONAL PROGRAM

2024-2025

Automotive Technician 1

COURSE OUTLINE - UC

DESCRIPTION:

Automotive Technician 1 is a foundational course that provides students with basic vehicle service skills and a general understanding of automotive system components for entry-level jobs. Emphasis is placed on proper use of common tools, equipment, personal protective equipment and OSHA safety practices in the workplace and general lab. Students will think critically and solve problems related to customer service and vehicle components such as engine repair, transmission, drive train systems, suspension/steering, electrical/electronic systems, and heating/air conditioning systems. Upon successful completion of this course, students will receive a solid foundation in National Automotive Technicians Education Foundation (NATEF) standards and be prepared for other industry certifications. Activities in this course include work-based learning that connects students to industry and the local community. Students must successfully complete Automotive Technician 1 and Automotive Technician 2 as part of the minimum requirements for articulation.

INFORMATION:

PRE-REQUISITE:	None
LENGTH:	One Year
SECTOR:	Transportation
PATHWAY:	Systems Diagnostic, Service and Repair
ARTICULATED:	Yes (after completion of Automotive Technician 2)
UC A-G APPROVAL:	Yes - College-Preparatory Elective (G) / Interdisciplinary

O*NET SOC CODES:

41-2022.00	Specialists Parts Salesperson
49-3023.00	Automotive Service Technicians and Mechanics
49-3031.00	Bus and Truck Mechanics and Diesel Engine Specialists
53-6031.00	Automotive and Watercraft Service Attendants

Orientation

A. Introduce the course and facilities.
B. Discuss the syllabus and major objectives.
C. Explain applicable classroom management procedures, and any operational guidelines.
D. Review instructor/student expectations.
E. Explain attendance requirements and procedures.
F. Review grading and student evaluation procedures.
G. Discuss the work-based learning aspect of the program, if applicable.
H. Discuss the “next steps” related to additional education, training, and employment.
I. Review classroom safety, emergency and disaster procedures.

1. Communication Skills

A. Demonstrate positive verbal communication skills using appropriate vocabulary, demeanor, and vocal tone in the classroom and/or worksite.
B. Read and interpret written information and directions.
C. Practice various forms of written communication appropriate to the occupation.
D. Practice positive body language skills.
E. Practice professional verbal skills for resolving a conflict.
F. Demonstrate active listening skills including techniques for checking for understanding, and for obtaining clarification of directions.

2. Interpersonal Skills

A. Demonstrate positive teamwork skills by contributing to a group effort.
B. Practice the importance of diversity awareness and sensitivity in the workplace.
C. Define sexual harassment in the workplace and identify the employee’s role and responsibility.
D. Practice participation skills.
E. Identify different personality types and demonstrate flexibility and adaptability working with diverse individuals.
F. Practice business and social etiquette skills appropriate to the occupation.
G. Evaluate and discuss the role of business and personal ethics in decision making based on various job-related scenarios.
H. Demonstrate the use of time management skills.

3. Employability Skills

A. Demonstrate appropriate attendance and punctuality practices for the classroom (and worksite, if applicable).

B. Prepare a resume, cover letter, and job application.
C. Demonstrate interviewing techniques in seeking employment, using appropriate tone, body language and professional dress and grooming standards.
D. Identify strategies for employment retention.
E. Identify and analyze sources of job information, including electronic sources and the impact of social networking on employability.
F. Identify the need for continuing education, professional development, and professional growth in chosen field.
G. Identify appropriate procedures for leaving a job.
H. Review company policies and current trends in employee compatibility screening, drug screening, and background checks.

4. Leadership

A. Define leadership and identify the responsibilities, competencies, and behaviors of successful leaders.
B. Work with peers to promote divergent and creative perspectives.
C. Demonstrate how to organize and structure work, individually and in teams, for effective performance and the attainment of goals.
D. Explain multiple approaches to conflict resolution and their appropriateness for a variety of situations in the workplace.
E. Employ ethical behaviors and actions that positively influence others.
F. Analyze the short-term and long-term effects a leader's actions and attitudes can have on productivity, morale, and organizational culture.

5. Personal and Occupational Safety

A. Demonstrate procedures to be followed in case of emergencies.
B. Describe and discuss the procedure for reporting a work-related hazard or injury (worker's comp), including ways to report a potential safety hazard to a supervisor.
C. Identify and discuss cyber ethics, cyber safety, and cyber security.
D. Apply personal safety practices to and from the job.
E. Recognize the effects of substance abuse in the workplace.
F. Explain the importance of CAL-OSHA in the industry.
G. Recognize good housekeeping and ergonomics as safety issues.
H. Identify safety hazards commonly found in the workplace environment.
I. Explain the importance and role of the Environmental Protection Agency (EPA).

6. Automotive Service Industry

A. Describe history of automotive industry.
B. Define current automotive industry and outlook of the automotive industry.
C. Identify careers and jobs in automotive service.
D. Visit the State of California DMV site and describe how to obtain a driver's license.

E. Briefly examine the California Driver's Handbook.
F. Emphasize the importance of keeping a clean driving record.

7. Shop Safety / OSHA-10

A. Explain general shop safety rules and identify procedures for safe handling of tools and equipment.
B. Locate OSHA and CAL-OSHA websites and identify resources that support worker safety.
C. Locate and interpret material safety data sheets (MSDS).
D. Comply with the required use of PPEs (safety glasses, ear protection, gloves, shoes, appropriate clothing), accessories and hairstyles for shop/lab activities.
E. Recognize various types of hazardous waste in a shop, the dangers they present and how to handle them for a safe workplace.
F. Identify the location and use of eye wash stations.
G. Identify the electrical hazards of working with electronic equipment.
H. Follow proper ventilation procedures for working within the lab/shop area.
I. Describe proper ergonomics for materials handling, safe lift operation, and preventing workplace injury.
J. Demonstrate proper placement of floor jacks and jack stands.
K. Recognize safety color-coding.
L. Demonstrate how to correctly work and walk on surfaces to avoid, control, and protect against falls, slips and trips.
M. Identify marked safety areas, posted evacuation routes, and demonstrate procedures to be followed in emergencies.
N. Identify location and types of fire safety equipment; then practice OSHA principles of fire prevention, fire control and fire safety.
O. Describe lockout/tagout procedures for accident and injury prevention. (OSHA).
P. Pass a safety test.

8. Automotive Math and Measurement

A. Demonstrate knowledge and basic skill in the performance in the use of measurement tools utilized within the automotive industry.
B. Measure the length of an object using a ruler with accuracy.
C. Measure common automotive parts using precision measuring tools.
D. Describe common uses of fasteners.
E. Identify standard metric designation of fasteners and identify bolts by grade, diameter, length, and thread pitch.
F. State safety rules relating to measurement.
G. Demonstrate how to use a conversion measurement chart.

9. Tools and Equipment

A. Identify tools and their usage in automotive applications.
B. Identify safe procedures for handling of tools and equipment.
C. Demonstrate appropriate use of tools and equipment.

D. Demonstrate proper cleaning, storage, and maintenance of tools and equipment.
E. Demonstrate proper use of precision measuring tools (i.e. micrometer, dial-indicator, dial-caliper).
F. Identify and use proper placement of floor jacks and jack stands.
G. Identify and use proper procedures for safe lift operation.

10. Preparing Vehicle for Service and Customer

A. Research applicable vehicle and service information, vehicle service history, service precautions, and technical service bulletins.
B. Locate and interpret vehicle and major component identification numbers (VIN, vehicle certification labels, and calibration decals).
C. Demonstrate the use of service information, computer resources, reference books, technical service bulletins, and other resources to accurately diagnose and repair automotive systems.
D. Explain how to properly document maintenance procedures in accordance with applicable laws.
E. Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction.
F. Safety check, fill, and replace to proper fluid levels: oil, engine coolant, power steering fluid, brake fluid, windshield washer fluid, differential/transfer case fluid, transmission fluid, etc. in accordance with manufacturer recommendations.
G. Identify the information needed and the service requested on a repair order.
H. Identify purpose and demonstrate proper use of fender covers and mats.
I. Demonstrate use of the three C's (concern, cause, and correction).
J. Review vehicle service history.
K. Ensure vehicle is prepared to return to customer per school/company policy (floor mats, steering wheel cover, etc.).

11. Engine Performance and Service

A. Demonstrate basic knowledge and skill of engine performance, diagnosis and service.
B. Locate the components of an engine and describe their function.
C. Visually check engine to determine engine condition.
D. Verify engine operating temperature.
E. Remove and replace spark plugs.
F. Perform cooling system pressure and dye tests to identify leaks; check coolant condition and level; inspect and test radiator, pressure cap, coolant recovery tank, and heater core; determine necessary action.
G. Inspect engine assembly for fuel, oil, coolant, and other leaks; determine necessary action.
H. Verify operation of the instrument panel engine warning indicators.
I. Inspect, replace, and adjust drive belts, tensioners, and pulleys; check pulley and belt alignment.
J. Perform engine oil and filter change.

12. Automatic Transmission and Transaxle

A. Describe OBD I and OBD II diagnostic trouble codes for automatic transmission.
B. Check fluid level in a transmission or a transaxle equipped with and without a dip-stick.
C. Check transmission fluid condition; inspect external seals, gaskets and bushings for leaks.
D. Inspect external manual valve shift linkage, transmission range sensor/switch, and park/neutral position switch.
E. Inspect power train mounts.
F. Drain and replace fluid and filter(s).

13. Manual Drive Train and Axle

A. Demonstrate skills to correctly perform a basic automatic transmission service.
B. Compare the operation of a conventional transmission to the operation of an electronic
C. transmission, including precautions to be followed in the routine service of an electronic transmission.
D. Check fluid condition: check for leaks and adjust fluids to proper levels.
E. Drain and refill manual transmission/transaxle and final drive unit.
F. Inspect clutch operation.
G. Describe the operational characteristics of an electronically controlled manual transmission/transaxle.
H. Clean and inspect differential housing; check for leaks; inspect housing vent.
I. Check and adjust differential housing fluid level.
J. Drain and refill differential housing.
K. Inspect drive axle.

14. Suspension and Steering Systems

A. Inspect and identify various types of steering and suspension system operation and components.
B. Inspect rack and pinion steering gear inner tie rod ends (sockets) and bellows boots.
C. Inspect and replace/adjust power steering pump drive belt.
D. Inspect pitman arm, relay (centerlink/intermediate) rod, idler arm and mountings, and steering linkage damper.
E. Inspect tie rod ends (sockets), tie rod sleeves, and clamps.
F. Inspect upper and lower control arms, bushings, and shafts.
G. Inspect and replace rebound and jounce bumpers.
H. Inspect track bar, strut rods/radius arms, and related mounts and bushings.
I. Inspect upper and lower ball joints (with or without wear indicators).
J. Inspect suspension system coil springs and spring insulators (silencers).
K. Inspect suspension system torsion bars and mounts.
L. Inspect and replace front stabilizer bar (sway bar) bushings, brackets, and links.
M. Inspect strut cartridge or assembly.
N. Inspect front strut bearing and mount.
O. Inspect rear suspension system lateral links/arms (track bars), control (trailing) arms.

P. Inspect rear suspension system leaf spring(s), spring insulators (silencers), shackles, brackets, bushings, center pins/bolts, and mounts.
Q. Inspect and remove/replace shock absorbers; inspect mounts and bushings.
R. Inspect electric power-assisted steering.
S. Identify hybrid vehicle power steering system electrical circuits and safety precautions.
T. Describe the function of the power steering pressure switch.

15. Wheels and Tires

A. Inspect for tire condition and wheel problems; determine necessary action.
B. Compare and contrast different types of tires and tire ratings.
C. Identify tire wear patterns and determine necessary action.
D. Check for correct tire size and application (load and speed ratings) and correct as necessary.
E. Rotate tires according to manufacturer's recommendations.
F. Dismount, inspect, and remount tire on wheel.
G. Inspect tire on wheel equipped with tire pressure monitoring system sensor.
H. Inspect tire and wheel assembly for air loss.
I. Identify tire pressure monitoring systems (indirect and direct) for operation.
J. Inspect and identify sensors in a tire pressure monitoring system.
K. Practice the use of torque wrench.
L. Inspect tire condition, adjust air pressure and/or determine necessary action.
M. Balance wheel and tire assembly (static and dynamic).
N. Dismount and remount tire on wheel equipped with tire pressure monitoring system sensor.
O. Inspect tire and wheel assembly for air loss; perform necessary action.
P. Repair tire using internal patch.
Q. Identify and test tire pressure monitoring systems (indirect and direct) for operation; verify operation of instrument panel lamps.
R. Demonstrate knowledge of steps required to remove and replace sensors in a tire pressure monitoring system.

16. Brakes

A. Describe brake system components.
B. Install wheel and torque lug nuts and practice the use of torque wrench.
C. Check master cylinder for external leaks and proper operation.
D. Select, handle, store, and fill brake fluids to proper level.
E. Inspect and describe the function for caliper, pads and rotors.
F. Inspect and describe the purpose for wheel bearings, seals and hub.
G. Identify function of caliper pistons on an integral parking system.
H. Inspect and demonstrate knowledge on function of wheel bearings, seals, and bearings.

I. Properly remove and clean wheel bearings.

17. Electrical/Electronic Systems

A. Demonstrate knowledge and basic skill of automotive electrical system components, including diagnostic and repair.
B. Describe the safety practices that should be followed when working with electrical systems.
C. Measure and describe the flow of electricity in a simple circuit including voltage, amperage, and resistance.
D. Demonstrate knowledge of electrical/electronic series, parallel, and series-parallel circuits using principles of electricity (Ohm's Law).
E. Perform battery state-of-charge test; determine necessary action.
F. Jump-start vehicle using jumper cables and a booster battery or an auxiliary power supply.
G. Measure key-off battery drain (parasitic draw).
H. Inspect and test fusible links, circuit breakers, and fuses; determine necessary action.

Battery Service

I. Confirm proper battery capacity for vehicle application; perform battery capacity test; determine necessary action.
J. Maintain or restore electronic memory functions.
K. Inspect and clean battery; fill battery cells; check battery cables, connectors, clamps, and hold-downs.
L. Perform slow/fast battery charge according to manufacturer's recommendations.

Starting and Charging System

M. Inspect switches, connectors, and wires of starter control circuits; determine necessary action.
N. Perform charging system output test; determine necessary action.
O. Inspect, adjust, or replace generator (alternator) drive belts; check pulleys and tensioners for wear; check pulley and belt alignment.

Lighting Systems and Accessories

P. Inspect interior and exterior lamps; replace as needed.
Q. Identify system voltage.
R. Inspect interior sockets including headlights and auxiliary lights (fog lights/driving lights); replace as needed.
S. Verify operation of instrument panel gauges and warning/indicator lights; reset maintenance indicators.
T. Verify windshield wiper and washer operation; replace wiper blades.

18. Heating and Air Conditioning

A. Demonstrate knowledge of function, diagnosis and maintenance of heating and cooling systems.
B. Describe safety precautions to be observed when working on heating and air conditioning systems.
C. Explain the function and operation of HVAC systems.
D. Identify basic components and operation of HVAC systems.
E. Inspect A/C compressor drive belts, pulleys, and tensioners; determine necessary action.

F. Inspect engine cooling and heater systems hoses; perform necessary action.
G. Inspect cabin filters; perform necessary action.
H. Identify the source of A/C system odors.
I. Keep checking and replacing air cabin filters.

19. Certifications

A. Demonstrate knowledge of safety certification requirements in SP/2 Safety and Environmental Training.
B. Complete certification requirements for *Valvoline* Motor Oil 101, *Valvoline* Auto Fluids 101 and *Valvoline* Auto Chemicals 101.

20. Portfolio

A. Create a professional digital portfolio reflecting employability skills in the relevant industry to include an “About Me” page.
B. Collect original works (in photographs and videos) and documents that demonstrate technical skills and knowledge in the industry.
C. Demonstrate knowledge of competencies by accompanying each selected document or work with a journal entry or summary.
D. Write a brief resume and cover letter to be included in portfolio.
E. Develop interviewing techniques using portfolio materials.
F. Display portfolio materials for critique by a professional panel (industry partners and classmates).
G. Gather feedback and update portfolio.

Key Assignments

Assignment	Competencies	Career Ready Practices	Anchor Standards	Pathway Standards	CCSS
1. Students will participate in mock interviews that represent current industry practices (e.g., skills demonstrations, resumes, applications, portfolios, personal websites, etc.).	1A, B, D 3B, C, D, I, J	2 3 10	2 3		LS 11-12.6 SLS 11-12.2
2. Students will research the automotive industry for an assigned decade and create a presentation on makes and models of cars including the newest technologies and innovations (e.g., drive train system, brake, steering and suspension systems, electrical systems, computer systems, cooling and lubrication systems, exhaust systems, body/frame construction and safety systems) and the impact of transportation on the economy, society (such as driver's license requirements), and American culture.	6A-F	1 4 5	2 4 5	C1.0 C2.0	WS 11-12.6 WS 11-12.7
3. Students will make a video tutorial for assigned tools and present to class. The tutorial should demonstrate proper use, safety precautions, maintenance, and storage practices. Organization and cleanliness of shop areas will be assessed regularly.	7A-N 9A-G 17A-T	1 4 5	2 4 5	C2.0	WS 11-12.6 WS 11-12.7
4. Accurately use a ruler and a precision measuring device. Select the proper types of bolts, nuts, and washers for a given task.	8A-G	1 5	5 10	C2.0	A-CED 4 RLST 11-12.3 RLST 11-12.4
5. Students will research and identify service information, parts, specifications and prepare a variety of vehicles for service according to industry standards using computerized resources, manuals, technical bulletins, and reference documents. Students will then create a poster that lists stages of the vehicle service preparation including documentation and return to customer.	1A - F 2A, D, I, J 3A, D 5B, G 7, 8, 9 10 A-L	1 2 11 12	4 5 6 10	C1.0 C2.0 C4.0 C5.0	WS 11-12.6 WS 11-12.7 RSTS 11-12.4 RLST 11-12.3 RLST 11-12.10 SEP 4, 8 CC 2 LS 2.D PS 4.C WS 11-12.4

Assignment	Competencies	Career Ready Practices	Anchor Standards	Pathway Standards	CCSS
6. Students will diagnose engine operation and performance and communicate necessary action to clients, i.e.: classmates and teacher. (Skills involved: communication, analytical, attention to detail, problem-solving, and application of specific automotive knowledge.)	1A - F 2A, D, I, J 3A, D 5B, G 7, 8, 9 11 A-J	1 4 5 11 12	2 4 5 6 10	C2.0 C3.0 C4.0 C6.0	LS 11-12.6 WS 11-12.6 WS 11-12.7 RSTS 11-12.4 RLST 11-12.3 RLST 11-12.10 SEP 4, 8 CC 2 ETS 1.B
1. Students will diagnose transmission operation and performance and communicate necessary action to clients, i.e.: classmates and teacher. (Skills involved: communication, analytical, attention to detail, problem-solving, and application of specific automotive knowledge.)	1A - F 2A, D, I, J 3A, D 5B, G 7, 8, 9 12 A-F 13 A-L	1 4 5 11 12	2 4 5 6 10	C2.0 C3.0 C4.0 C8.0	LS 11-12.6 WS 11-12.6 WS 11-12.7 RSTS 11-12.4 RLST 11-12.3 RLST 11-12.10 SEP 4, 8 CC 2 ETS 1.B
7. Students will test and diagnose steering and suspension components and communicate necessary action to clients, i.e.: classmates and teacher. (Skills involved: communication, analytical, attention to detail, problem-solving, and application of specific automotive knowledge.) 2. .	1A - F 2A, D, I, J 3A, D 5B, G 7,8,9 14 A-T	1 4 5 11 12	2 4 5 6 10	C2.0 C3.0 C4.0 C8.0	LS 11-12.6 WS 11-12.6 WS 11-12.7 RSTS 11-12.4
3. Students will successfully perform maintenance and repair of tires and wheels.	15 A-T	1 4 5	2 4 5	C2.0 C3.0	LS 11-12.6 WS 11-12.6
4. Pass a braking system test identifying and describing components, functionality, and maintenance.	16 A-I	1 4 5 11 12	2 4 5 6 10	C2.0 C3.0 C4.0	LS 11-12.6 WS 11-12.6
5. Students will demonstrate safety practices to be followed	1A - F 2A, D, I, J	1 4	2 4	C2.0 C3.0	LS 11-12.6 WS 11-12.6

Assignment	Competencies	Career Ready Practices	Anchor Standards	Pathway Standards	CCSS
inspecting and diagnosing electric systems. Accurately use electrical test instruments to measure voltage, amperage, and resistance.	3A, D 5B, G 7,8,9 17 A-T	5 11 12	5 6 10	C4.0 C6.0	WS 11-12.7 RSTS 11-12.4 RLST 11-12.3 RLST 11-12.10 SEP 4, 8 CC 2 ETS 1.B
6. Inspect hoses, A/C compressor drive belts, pulleys, and tensioners; determine and perform necessary action.	1A - F 2A, D, I, J 3A, D 5B, G 7, 8, 9 18 A-I	1 4 5 11 12	2 4 5 6 10	C2.0 C3.0 C4.0 C7.0	LS 11-12.6 WS 11-12.6 WS 11-12.7 RSTS 11-12.4 PS 3.B
7. Students will pass performance and written tests for certifications.	7-14, 16 19 A-B	1, 4,5	**4,5,10**	**C1**	LS 11-12.6 WS 11-12.6,7 RLST 11-12.3,4 SEP 4, 8

Standards Assessed in this Program

Career Ready Practices

1. Apply appropriate technical skills and academic knowledge.
2. Communicate clearly, effectively, and with reason.
3. Develop an education and career plan aligned to personal goals.
4. Apply technology to enhance productivity.
5. Utilize critical thinking to make sense of problems and persevere in solving them.
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/global competence.
10. Demonstrate creativity and innovation.
11. Employ valid and reliable research strategies.
12. Understand the environmental, social, and economic impacts of decisions.

Anchor Standards

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

3.0 Career Planning and Management
- Integrate multiple sources of career information from diverse formats to make informed career decisions, solve problems, and manage personal career plans.

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

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

6.0 Health and Safety
- Demonstrate health and safety procedures, regulations, and personal health practices and determine the meaning of symbols, key terms, and domain-specific words and phrases as related to the sector workplace environment.

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

8.0 Ethics and Legal Responsibilities

- Practice professional, ethical, and legal behavior, responding thoughtfully to diverse perspectives and resolving contradictions when possible, consistent with applicable laws, regulations, and organizational norms.

9.0 Leadership and Teamwork

- Work with peers to promote divergent and creative perspectives, effective leadership, group dynamics, team and individual decision making, benefits of workforce diversity, and conflict resolution.

10.0 Technical Knowledge and Skills

- Apply essential technical knowledge and skills common to all pathways in the sector following procedures when carrying out experiments or performing technical tasks.

Pathway Standards

Transportation - Systems Diagnostics and Service 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.
C2.0 Practice the safe and appropriate use of tools, equipment, and work processes.
C3.0 Use scientific principles in relation to chemical, mechanical, and physical functions for various engine and vehicle systems.
C4.0 Perform and document maintenance procedures in accordance with the recommendations of the manufacturer.
C5.0 Apply and understand appropriate business practices.
C6.0 Demonstrate the application, operation, maintenance, and diagnosis of engines, including, but not limited to, two- and four-stroke and supporting subsystems.
C7.0 Demonstrate the function, principles, and operation of electrical and electronic systems using manufacturer and industry standards.
C8.0 Demonstrate the function and principles of automotive drivetrain, steering and suspension, brake, and tire and wheel components and systems in accordance with national industry standards.

Common Core State Standards

ENGLISH LANGUAGE ARTS

Language Standards

LS 11-12.6: Acquire and use accurately 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 2.D

Reading Standards for Literacy in Science and Technical Subjects

RLST 11-12.3: 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.

RLST 11-12.4: 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.
RLST 11-12.10: By the end of grade 12 read and comprehend science/technical texts in the grades 11-12 text complexity band independently and proficiently.

Speaking and Listening Standards

SLS 11-12.2: 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.
SLS 11-12.1: 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 11-12.1d: 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.

Writing Standards

WS 11-12.4: Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
WS 11-12.6: 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.
WS 11-12.7: 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.

MATHEMATICS

Algebra- Creating Equations

A-CED 4: Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. For example, rearrange Ohm's law V = IR to highlight resistance R.

SCIENCE

Crosscutting Concept

CC 2: Cause and effect: Mechanism and explanation

Engineering, Technology, and the Applications of Science

ETS 1.B: Developing Possible Solutions

Physical Sciences

PS 3.A: Definitions of Energy
PS 3.B: Conservation of Energy and Energy Transfer

PS 4.C: Information Technologies and Instrumentation

Scientific and Engineering Practices

SEP 4: Analyzing and interpreting data

SEP 8: Obtaining. evaluating, and communicating information