



Riverside County Office of Education – Career Technical Education

RCOE AUTOMOTIVE – AUTOMOTIVE SERVICE TECHNICIAN I

DATE:

INDUSTRY SECTOR: Transportation Sector

PATHWAY: Systems Diagnostics, Service and Repair

CALPADS TITLE: Introduction to Systems Diagnostics, Service, and Repair

CALPADS CODE: 8530

HOURS:

Total	Classroom	Laboratory/CC/CVE
180	90	90

JOB TITLE	O*NET CODE	JOB TITLE	O*NET CODE
Automotive Specialty Technicians	49-3023.02	Automotive Master Mechanics	49-3023.01
Automotive and Watercraft Service Attendants	53-6031.00	Automotive Engineers	17-2141.02

COURSE DESCRIPTION:

Auto AST I (Automotive Service Technician I) This course is first in a series of three courses which will lead to industry certification and provide a foundation for post-secondary education or training. AST 1 is designed as a beginning automotive mechanic course that introduces students to automobile service and repair, shop safety, engine repair, automatic transmissions and transaxles, manual drive train and axles, suspension and steering, brakes, electrical and electronic systems, heating and air conditioning, and engine performance. After completion of this course, students will be prepared for many entry level positions in today’s automotive service industry* and ready to advance to AST II.

This course will also provide students with the opportunity to apply and extend concepts studied in their math and science classes (related to algebra, basic arithmetic, physics, and electrical, computer, and chemical sciences) to the automotive technology industry.

*Tire Installer, Battery & Tire Installer, Lot Porter, and Lube Technician

A-G APPROVAL: G

ARTICULATION:

College	Course Code
Mount San Jacinto College	AUME 100 – Basic Auto Mechanics
Mount San Jacinto College	AUME 126 – Automotive Electrical

DUAL ENROLLMENT: None

PREREQUISITES:

Prerequisite
None

METHODS OF INSTRUCTION

- Direct instruction
- Group and individual applied projects
- Multimedia
- Demonstration
- Field trips
- Guest speakers

STUDENT EVALUATION:

- Student projects
- Written work
- Exams
- Observation record of student performance
- Completion of assignment

INDUSTRY CERTIFICATION:

- None

RECOMMENDED TEXTS:

- Modern Automotive Technology James E. Duffy Goodheart-Willcox 9th - 2017

PROGRAM OF STUDY

Grade	Fall	Spring	Year	Course Type	Course Name
9, 10, 11, 12				Introductory	RCOE Automotive – Automotive Service Technician I
10, 11, 12				Concentrator	RCOE Automotive – Automotive Service Technician II
11, 12				Capstone	RCOE Automotive – Automotive Service Technician III

I.	INTRODUCTION: AUTOMOTIVE PATHWAY AND CAREERS	CR	Lab/ CC	Standards
	<p>Industry recognized ASE Certification, Employment Opportunities, Employment Pathways Options, and Occupational Careers.</p> <p>Unit Assignment(s):</p> <p>In this unit, students will demonstrate their knowledge of automotive careers through a research project beginning with an interview of a professional currently employed in the industry. The written research project will include an explanation of the ASE (National Institute for Automotive Service Excellence) certification process. In addition to an interview, students will use reference materials, technical service bulletins, and other related documents as part of their research. Students will demonstrate their knowledge of basic shop operation by observing employees and their different job responsibilities while in the lab/shop, which includes successfully identifying the NATEF (National Automotive Technicians Education Foundation) related job designations.</p>	10	10	<p>Academic: RLST: 11-12.3</p> <p>CTE Anchor: Career Planning and Management: 3.5</p> <p>CTE Pathway: C8.6</p>
II.	GENERAL SHOP SAFETY: SHOP RULES AND PROCEDURES	CR	Lab/ CC	Standards
	<p>Tools and Equipment Safety Procedures</p> <ul style="list-style-type: none"> • Floor jacks and jack stands safety procedures • Safe lift operation procedures • Ventilation safety procedures • Marked safety area • Fire safety equipment • Eyewash station procedures • Evacuation procedures • Personal safety devices and procedures • Vehicle safety procedures • Material safety data sheets (MSDS) <p>Unit Assignment(s):</p> <p>In this unit, students will demonstrate through a safety test, research, and worksheets their knowledge of shop rules and procedures, tools and equipment safety, OSHA regulations, and personal safety procedures.</p> <p>In the lab/shop, students will practice safe handling, and storage, and disposal of chemicals and hazardous waste in accordance with the SDS and the requirements of local, state, and federal regulatory agencies.</p> <p>Students will demonstrate in the lab/shop their knowledge of shop and personal safety by successfully completing the NATEF (National Automotive Technicians Education Foundation) related tasks, such as researching a specific chemical in the shop and reporting on the safety considerations, chemical properties, and environmental influences of chemical is chosen.</p>	10	10	<p>Academic: RLST: 11-12.3</p> <p>CTE Anchor: Communications: 2.3</p> <p>CTE Pathway: C8.6</p>
III.	CAREER PATHWAYS	CR	Lab/ CC	Standards
	<p>Workplace Employability Personal Soft-Skills including:</p> <ul style="list-style-type: none"> • Punctuality • Receptive to directions • Motivation • Appropriate dress • Appropriate personal hygiene • Employment eligibility criteria • Honesty • Integrity • Reliability <p>Workplace Employability Skills-Work Habits/Ethics such as:</p>	10	10	<p>Academic: F-IF: 4</p> <p>CTE Anchor: Demonstration and Application: 11.4</p> <p>CTE Pathway: C1.1</p>

- Workplace policies/laws compliance
- Teamwork
- Negotiates solutions
- Contributes ideas
- Follows directions
- Communicates effectively
- Reads and interprets workplace documents
- Writes clearly and concisely
- Analyzes and resolves problems
- Organizes a productive work plan
- Courteous and knowledgeable customer services
- Uses scientific, technical, engineering, and mathematics principles and reasoning to accomplish tasks

Job Search practices in the automotive profession including:

- Resume
- Job application
- Interview techniques
- Practice Interview

Unit Assignment(s):

Students will create a Portfolio of work including cover page, table of contents, cover letter, resume, recommendation letters, and samples of student work.

In this unit, students will study appropriate workplace employability standards via their personal standards, work habits, and ethics in the lab/shop.

Students will demonstrate their knowledge of the employment process by preparing a resume, a job application, and a portfolio of work, and reviewing appropriate interview practices.

Students will participate in a practice interview with fellow student followed by a practice interview with a professional interviewer, and obtaining at least one interview at a commercial auto shop.

Students will demonstrate in the lab/shop their knowledge of workplace employability standards by successfully completing the NATEF (National Automotive Technicians Education Foundation) related tasks.

IV.	TOOLS AND EQUIPMENT: TOOL IDENTIFICATION	CR	Lab/ CC	Standards
	<p>Automotive usage of tools</p> <ul style="list-style-type: none"> • This unit covers hand tools, precision measuring tools, power tools, and shop equipment <p>Unit Assignment(s):</p> <p>Usage of precision measuring tools</p> <p>In this unit, students will first confirm, through worksheets, tasks, and quizzes, their knowledge of common automotive tools including precision measuring tools.</p> <p>In the lab/shop, students will practice appropriate selection, use, and storage of precision measuring tools including micrometer, dial indicator, digital caliper, feeler gauge, torque wrench, bore gauge, and tape measure.</p> <p>Students will demonstrate in the lab/shop their knowledge of tool and equipment use, maintenance, and storage by successfully completing the NATEF (National Automotive Technicians Education Foundation) related tasks. These tasks include measuring and evaluating brake rotors, measuring and gapping spark plugs, and torquing wheel lug nuts.</p>	10	10	<p>Academic: RLST: 11-12.3</p> <p>CTE Anchor: Technology: 4.2</p> <p>CTE Pathway: C8.6</p>

V.	VEHICLE MAINTENANCE	CR	Lab/ CC	Standards
	<p>Students will be able to perform vehicle maintenance, fluid service, and recycling operations of a modern automotive vehicle. Students will be able to evaluate different automotive fluid conditions, use service information systems to determine system capacities, and determine necessary actions.</p> <p>Unit Assignment(s):</p> <p>Maintenance Service</p> <p>In this unit, students will demonstrate, by performing a vehicle maintenance service, their knowledge of common automotive service procedures and types and viscosities of fluids used.</p> <p>In the lab/shop, students will practice appropriate documentation of a maintenance service, the specific procedures, and perform a maintenance service on a vehicle using an industry provided a checklist.</p> <p>Students will demonstrate in the lab/shop their knowledge/utilization of personal protection, maintenance, hazardous materials handling, storage, and recycling procedures by successfully completing the NATEF (National Automotive Technicians Education Foundation) related tasks.</p>	10	10	<p>Academic: RLST: 11-12.3</p> <p>CTE Anchor: Career Planning and Management: 3.9</p> <p>CTE Pathway: C8.6</p>
VI.	SUSPENSION AND STEERING (A4)	CR	Lab/ CC	Standards
	<p>General Suspension and Steering Systems Diagnosis</p> <p>Vehicle and service information</p> <p>Wheels and Tires Purchasing, Diagnosis, and Repair</p> <p>Wheel Bearing Service</p> <ul style="list-style-type: none"> • Tire condition, wear patterns, and correct tire size • Tire rotation • Tire Pressure Monitoring System • Balance (static and dynamic) • Air loss <p>Unit Assignment(s):</p> <p>In this unit, students will practice suspension system diagnosis by researching applicable vehicle and service information (including the use of technical service bulletins (TSB's), campaigns, and recalls), vehicle service history, and service precautions.</p> <p>In this unit, students will practice wheels and tires diagnosis by inspecting tire condition, identifying tire wear patterns, performing tire rotation, checking for correct tire size and adjusting air pressure; dismount, mount, and balance the tire on a wheel with and without a tire pressure monitoring system sensor. The student will test, adjust and calibrate the tire pressure monitoring system according to vehicle manufacturer recommendations.</p> <p>Students will demonstrate in the lab/shop their knowledge of suspension and steering by successfully completing the NATEF (National Automotive Technicians Education Foundation) related tasks.</p>	10	10	<p>Academic: RLST: 11-12.3</p> <p>CTE Anchor: Career Planning and Management: 3.9</p> <p>CTE Pathway: C8.6</p>
VII.	ELECTRICAL/ELECTRONIC SYSTEMS (A6)	CR	Lab/ CC	Standards
	<p>General Electrical System Diagnosis</p> <ul style="list-style-type: none"> • Vehicle and service information • Ohm's Law • Digital Multimeter (DMM) • Circuit problems • Test light • Fusible links, circuit breakers, and fuses 	10	10	<p>Academic: RLST: 11-12.3</p> <p>CTE Anchor: Communications: 2.1</p> <p>CTE Pathway: C8.6</p>

- Electrical connectors and terminal ends
- Solder repair

Unit Assignment(s):

In this unit, students will practice general electrical system diagnosis by researching applicable vehicle and service information (including the use of technical service bulletins (TSB's), campaigns, and recalls), vehicle service history, and service precautions.

Students will demonstrate critical thinking skills while analyzing electrical/electronic series, parallel, and series-parallel circuits using principles of electricity/Ohm's Law; demonstrate the proper use of a digital multimeter (DMM) when measuring source voltage, voltage drop, current flow and resistance; formulate hypotheses of the causes and effects from shorts, grounds, opens, and resistance problems in electrical/electronic circuits; examine the operation of electrical circuits with a test light; inspect and test fusible links, circuit breakers, and fuses and determine necessary action; replace electrical connectors and terminal ends; and perform solder repairs of electrical wiring.

In this unit, students will practice starting system diagnosis by performing starter current draw tests and determining necessary action; performing starter circuit voltage drop tests and determining necessary action; inspecting and testing starter relays/solenoids and determining necessary action; and inspecting and testing switches, connectors, and wires of starter control and circuits and determining necessary action.

Students will practice charging system diagnosis by performing charging system output test and determining the necessary action and inspecting generator (alternator) for wear and belt alignment.

Students will practice lighting system diagnosis by inspecting the interior and exterior lamps and sockets and determining necessary action.

In this unit, students will practice accessories diagnosis by disarming and enabling an airbag system; verifying operation of instrument panel gauges and warning/indicator lights and maintenance indicators, and verifying windshield wiper and washer operation.

Students will demonstrate in the lab/shop their knowledge of electrical and electronic systems by successfully completing the NATEF (National Automotive Technicians Education Foundation) related tasks.

VIII.	ENGINE COOLING SYSTEM (A1)	CR	Lab/ CC	Standards
	General Engine Cooling System Diagnosis and Repair Vehicle and service information Engine coolant evaluation (specific gravity and conductivity test) Belts and hoses Thermostat operation Engine heater system Unit Assignment(s): In this unit, students will perform general cooling system diagnosis by researching applicable vehicle and service information (including the use of technical service bulletins (TSB's), campaigns, and recalls), vehicle service history, and service precautions. Students will remove, evaluate, and install belts, hoses, thermostats, and determine necessary action. Students will practice cooling system component diagnosis by inspecting and evaluating water pump, drive belts, pulleys, and tensioners, hoses and	10	10	Academic: RLST: 11-12.3 CTE Anchor: Communications: 2.1 CTE Pathway: C8.6

	<p>determine necessary action.</p> <p>In this unit, students will practice engine cooling systems service by examining engine coolant and heater system hoses and recognizing the required action.</p> <p>Students will demonstrate in the lab/shop their knowledge of cooling systems by successfully completing the NATEF (National Automotive Technicians Education Foundation) related tasks.</p>			
IX.	ENGINE PERFORMANCE (A8)	CR	Lab/CC	Standards
	<p>General Engine Diagnosis</p> <ul style="list-style-type: none"> • Engine air filter evaluation • Cylinder power balance test • Cylinder cranking and running compression tests • Cylinder leakage test • Spark plugs • Emission control systems • Vehicle and service information • Diagnostic Trouble Code retrieval and evaluation <p>Unit Assignment(s):</p> <p>In this unit, students will practice critical thinking skills while performing general engine diagnosis by researching applicable vehicle and service information (including the use of technical service bulletins (TSB's), campaigns, and recalls), vehicle service history, and service precautions.</p> <p>Students will perform engine absolute (vacuum/boost) manifold pressure tests and determine necessary action; perform cylinder power balance test and determining necessary action; perform cylinder cranking and running compression tests and determine necessary action; perform cylinder leakage test and determining necessary action, and inspect secondary ignition components for wear and damage.</p> <p>Students will verify the engine operating temperature and determine necessary action.</p> <p>In this unit, students will practice fuel, air induction, and exhaust diagnosis by inspecting air filters, filter housing, and intake ductwork and identifying necessary action; and inspecting the condition of exhaust system hangers, brackets, clamps, and heat shield and identifying the necessary action.</p> <p>Students will demonstrate in the lab/shop their knowledge of engine performance by successfully completing the NATEF (National Automotive Technicians Education Foundation) related tasks.</p>	10	10	<p>Academic: RLST: 11-12.3</p> <p>CTE Anchor: Communications: 2.1</p> <p>CTE Pathway: C4.3, C8.6</p>
X.	COURSE NOTES:	CR	Lab/CC	Standards
	<p>Course Notes:</p>	0	0	<p>Academic: RLST: 11-12.3</p> <p>CTE Anchor: Communications: 2.1</p> <p>CTE Pathway: C1.1</p>

Entered by:

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