

MISSION TRAILS REGIONAL OCCUPATION PROGRAM

- 1. COURSE TITLE:** AUTOMOTIVE SERVICE TECHNOLOGY
- 2. CBEDS TITLE:** AUTOMOTIVE MECHANICS COMBINATION
- 3. CBEDS NUMBER:** 5655
- 4. JOB TITLES:**
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|-----------------------------------|-------------|
| Steam Cleaner | 915.687-026 |
| Brake Adjuster | 620.684-018 |
| Brake drum Lathe Operator | 620.682-010 |
| Tire Repairer | 915.684-010 |
| Automobile Radiator Mech-R&R | 620.381-010 |
| Lubrication Service | 915.687-018 |
| Porter, used car lot | 915.687-022 |
| Automobile Washer | 919.687-014 |
| Auto-Mechanic Helper | 620.684-014 |
| Automobile Wrecker | 620.684-010 |
| Auto Accessories Installer | 806.684-038 |
| Service Station Attendance | 915.467-010 |
| Brake Repair (Automotive) | 620.281-026 |
| Front End Mechanic (Not frame) | 620.281-038 |
| Tune-up Mechanic Assist. | 620.281-066 |
| Transmission Mechanic Assist | 620.281-062 |
| Mechanical Unit Repair (Auto) | 620.381-018 |
| Auto Mechanic- Entry Apprentice | 620.261-010 |
| Engine Repair Service Entry Level | 625.281-018 |
| New Car Preparation | 806.361-026 |
| Auto Technician-Exhaust Emissions | 620.281-014 |
| Auto generator Starter Repairer | 721.281-010 |
| Muffler Installer | 807.664-010 |
| Electrician helper, Automotive | 825.684-010 |
| Machinist, Automotive | 600.280-034 |

5. COURSE DESCRIPTION: This course is for all students seeking a variety of skills in Automotive Service and Maintenance Careers. This is a comprehensive NATEF (National Automotive Technicians Education Foundation) Standards educational plan and hands-on skills introduction for specialized subject areas of Auto Mechanics Technology, Electrical systems, Engine Performance, Brakes, Suspension and Steering Systems, and front-end repair and alignment. Additionally, an introduction to Engine Repair, Manual Drive Train and Axles, Heating Ventilation/Air Conditioning, and Automatic/Manual Transmissions is included. Furthermore, students will be introduced to the installation of a variety of automobile accessories such as radios, mirrors, and windshield wipers. Technical Manuals, research systems, and hand & Power Tools are an essential component of automotive service and are required of all students during training. Students will be able to learn and develop entry-level employment skills through classroom small/large group interaction, lab training, and cooperative learning methodologies. Students will obtain fundamental automotive servicing skills by performing the maintenance, simple repairs, analysis and parts replacement of automobiles. Students will develop professional attitudes and skills to meet career performance standards through group interaction while completing assignments and hands-on projects. All instruction and training includes developing awareness of, procedures, and following strict standards of the Environmental Protection Agency and Occupational Safety and Health Act Regulations. Students will develop essential competencies and foundational critical thinking skills throughout the process of completing projects within groups and/or independent activities. Expected student outcomes include developing skills to dismantle nonfunctioning automotive systems to identify and remedy malfunctioning parts, determine correct component replacements and accurately replace new and/or used equipment components to bring automotive vehicles to full operation. This 2-year program includes Community Classroom training. Student outcomes and program effectiveness are evaluated through measures of achievement of completed assignments and projects, and written theory examination as required by the instructor and instruction materials. In all areas, entry level employment may be appropriate; advanced entry is available to Articulated Institutions such as local Community College Auto Training programs or admittance to other regional area private automotive training institutions.

6. HOURS: 1080 hours = 6 semesters

7. PREREQUISITES: Tech Core, Electronics recommended or Instructor approved

8. REVISION DATE: March 14, 2007

9. CDE RECERTIFICATION: September 24, 2003

9. COURSE OUTLINE:

a) CONTENT AREA SKILLS

- i) EXPECTED STUDENT OUTCOMES
- ii) HOURS OF INSTRUCTION

COURSE OUTLINE

CONTENT AREA SKILLS	EXPECTED STUDENT OUTCOMES	HOURS			
		CL	LA	CC	CP
Instruction will include:	Student will be able to Demonstrate and:				
<p>1. Introduction to Auto Mechanics Technology: Section I presents an acquaintance with the events and development of automobiles and significant people and their contributions throughout the history of automobiles. Safety, Shop, appropriate job tools, research sources, automobile components and Careers in automotive technology will be included.</p>	<p>1a.) Identify the safe use of chemicals, hand tools, power tools, protective clothing and equipment, fire protection equipment, shop equipment. 1b.) Follow EPA and OSHA regulations 1c.) Communicate with customers and write repair orders. 1d.) Estimate time and cost for job and order parts. 1e.) Obtain appropriate repair information from shop manuals. 1f.) Practice clean and orderly work habits (vehicles, tools, and work areas) 1g.) Identify basic function and operation of vehicle mechanical components. 1h.) Identify auto mechanics career opportunities and the duties of a technician.</p>	20			
<p>2. Electrical Systems: A comprehensive introduction to: General Electrical System Diagnosis Battery Diagnosis and Service Starting System Diagnosis and Repair Charging System Diagnosis and Repair Lighting System Diagnosis and Repair Gauges and Electrical Accessories</p>	<p>2a.) Understand concept of and check continuity in electrical circuits using test light and voltmeter, oscilloscope and wiring diagram. 2b.) Understand the concept of and check for shorts, opens, and grounds. 2c.) Measure resistance in electrical circuits using an Ohmmeter. 2d.) Measure volts with a voltmeter or oscilloscope. 2e.) Measure current with an ammeter. 2f.) Clean and inspect battery clamps, cables, and connectors. 2g.) Perform battery condition tests. 2h.) Jump-start a vehicle. 2i.) Charge and install a battery 2j.) Diagnose starting systems and determine needed repair. 2k.) Remove, clean and inspect starter</p>	100	90	8	

	<p>motor and components.</p> <p>2l.) Repair or replace starter motor components.</p> <p>2m.) Diagnose charging system and determine needed repairs</p> <p>2n.) Remove, clean and inspect alternator.</p> <p>2o.) Repair or replace alternator components.</p> <p>2p.) Repair or replace charging system components.</p> <p>2q.) Diagnose lighting system problems and determine needed repairs.</p> <p>2r.) Repair or replace lights, sockets, wires, and switches.</p> <p>2s.) Diagnose and repair gauge and warning circuits.</p> <p>2t.) Diagnose and repair electrical accessories (horn, wiper-motor).</p>				
<p>3. Engine Performance: A comprehensive introduction to: Ignition Systems Fuel and Exhaust Systems Emission Control Systems</p>	<p>3a.) Conduct engine performance test using engine analyzer and determine needed repairs.</p> <p>3b.) Inspect, repair, or replace primary ignition components.</p> <p>3c.) Inspect repair, or replace secondary ignition components.</p> <p>3d.) Adjust ignition system to manufacturer's specifications.</p> <p>3e.) Perform on-board computer system diagnosis.</p> <p>3f.) Repair or replace computer system components.</p> <p>3g.) Diagnose fuel system problems and determine needed repairs.</p> <p>3h.) Inspect, repair, or replace fuel supply component.</p> <p>3i.) Disassemble, clean, and inspect carburetors.</p> <p>3j.) Reassemble and adjust carburetors.</p> <p>3k.) Adjust computer-controlled fuel systems (injection and carburetion).</p> <p>3l.) Diagnose and repair exhaust system problems</p> <p>3m.) Diagnose emission control systems and determine needed repairs.</p> <p>3n.) Clean, inspect/replace PCV system components.</p> <p>3o.) Clean, inspect/replace spark timing controllers.</p> <p>3p.) Clean inspect/replace idle speed controllers</p> <p>3q.) Clean inspect/replace exhaust gas re-</p>	130	120	8	

	<p>circulation.</p> <p>3r.) Clean inspect/replace air management system.</p> <p>3s.) Clean, inspect/replace intake manifold heat controls</p> <p>3t.) Clean, inspect/replace fuel vapor controls.</p>				
<p>4. Brake Systems: An introduction to: Diagnostics and repairs of Hydraulic Systems Diagnostics and repairs of Drum Brakes Diagnostics and repairs of Disc Brakes Diagnostics and repairs of Power Assist Brakes</p>	<p>4a.) Diagnose hydraulic brake systems and determine needed repairs.</p> <p>4b.) Inspect and repair or replace master cylinders and lines of the hydraulic system.</p> <p>4c.) Inspect and replace switches and valve devices.</p> <p>4d.) Diagnose and determine needed repairs on disc brake systems.</p> <p>4e.) Remove, clean, and inspect drum brake assemblies.</p> <p>4f.) Repair, replace, and adjust drum brake components.</p> <p>4g.) Diagnose and determine needed repairs, on disc brake systems.</p> <p>4h.) Remove, clean, and inspect disc brake components.</p> <p>4i.) Repair, replace and adjust disc brake components.</p> <p>4j.) Diagnose and determine needed repairs on power assist brakes.</p> <p>4k.) Repair or replace power brake components.</p> <p>4l.) Repair ore replace hydra-boost components.</p> <p>4m.) check operations of anti-skid braking system, adjust or repair according to manufacturer's recommendations.</p> <p>4n) On board Brake Lathe trng.</p>	50	40	10	
<p>5. Suspension and Steering Systems: An introduction to: Steering Systems Diagnostics and repairs of Suspension Systems Diagnostics and repairs of Rear Suspension Systems Tire and Wheel Alignment Tire and Wheel diagnostics and repairs</p>	<p>5a.) Diagnose and determine needed repairs on steering systems.</p> <p>5b.) Clean and inspect power and manual steering gear boxes.</p> <p>5c.) Clean and inspect power and manual rack and pinion steering rack.</p> <p>5d.) Reassemble, adjust and install power and manual rack and pinion steering rack.</p> <p>5e.) Inspect and repair steering columns.</p> <p>5f.) Inspect and replace steering linkage components.</p> <p>5g.) Inspect, repair and replace power steering pumps.</p> <p>5h.) Diagnose and determine needed repairs on conventional and electronic front</p>	50	40	10	

	<p>suspension systems.</p> <p>5i.) Inspect and repair control arm and spring assemblies on conventional systems.</p> <p>5j.) Inspect and repair wheel spindles and bearings.</p> <p>5k.) Inspect and replace shock absorbers and stabilizer bars.</p> <p>5l.) diagnose and determine needed repairs on Macpherson Strut Assemblies.</p> <p>5m.) Clean, inspect, and assemble Macpherson Strut Assemblies.</p> <p>5n.) diagnose and determine needed repairs on conventional and electronic rear suspension systems.</p> <p>5o.) Inspect and replace shock and spring assemblies.</p> <p>5p.) Inspect and replace Macpherson Strut Assemblies.</p> <p>5q.) Inspect and repair suspension linkages and bushings.</p> <p>5r.) diagnose steering and tire wear problems.</p> <p>5s.) Determine needed repairs on steering and tires.</p> <p>5t.) Set, correct, align angles on front wheels.</p> <p>5u.) Set, correct, camber and toe on rear wheels.</p> <p>5v.) Rotate and balance tire and wheel assemblies.</p>				
<p>6. Engine Repair: An introduction to: General Engine Diagnostics Remove & Replace Engines Cylinder Head and Valve Train Diagnostics Short Block Repairs Engine Completion and Start-up Procedures Engine Lubrication Cooling Systems Diagnostics Cooling Systems Repairs</p>	<p>6a.) Conduct performance tests and determine needed repairs.</p> <p>6b.) Remove and replace engine (front and rear wheel drives).</p> <p>6c.) Remove Cylinder head(s)</p> <p>6d.) Determine needed repairs to cylinder head(s).</p> <p>6e.) Recondition cylinder head(s).</p> <p>6f.) Install reconditioned cylinder head(s).</p> <p>6g.) Inspect and determine condition of cams and related components of valve train.</p> <p>6h.) Replace re-conditioned cams and related valve train components.</p> <p>6i.) Inspect and replace pans, covers, gaskets and seals.</p> <p>6j.) Disassemble, inspect and clean short block assembly.</p> <p>6k.) Check and record short block measurements.</p> <p>6l.) Check and record component</p>	60	50	9	

	<p>measurements.</p> <p>6m.) Clean and prep block and components for re-assembly.</p> <p>6n.) Reassemble short block components using correct lubricant, gaskets, sealers, and torque to specifications.</p> <p>6o.) Complete engine assembly and pre-lube.</p> <p>6p.) Start engine and set fuel and ignition system to manufacturer's specifications.</p> <p>6q.) Inspect and repair oil system and related components.</p> <p>6r.) Perform cooling system test(s).</p> <p>6s.) Determine needed repairs to cooling system.</p> <p>6t.) Inspect, replace, and adjust drive-belts and hoses.</p> <p>6u.) Replace cooling system components (thermostat, radiator, controllers).</p> <p>6v.) Inspect coolant, drain, flush, and re-fill cooling system with recommended coolant.</p> <p>6w.) Perform oil and lubrication service on normally aspirated and turbo-charged systems.</p>				
<p>7. Manual Drive Train and Axles: An introduction to: Clutch Diagnostics and Repairs Manual Transmission Diagnostics and Repairs Manual Transaxle Diagnostics and Repairs Diagnostics and Repairs of Drive Shaft, CV Joint and Front Wheel Drive bearings Differential Diagnostics and Repairs 4-Wheel Drive Diagnostics and Repairs</p>	<p>7a.) Diagnose, conduct a performance test and determine needed repair to manual transmission.</p> <p>7b.) Remove, disassemble, inspect and clean manual transmission/transaxle and shift linkages.</p> <p>7c.) Re-assemble manual transmission/transaxle assembly, check end-play adjustments performed.</p> <p>7d.) Diagnose and determine needed repairs to Drive shaft, CV Joint, and Front Wheel Drive bearings.</p> <p>7e.) Inspect, service, and replace front axle shafts.</p> <p>7f.) Inspect, service, and replace drive shafts.</p> <p>7g.) Diagnose and determine needed repairs to Differentials.</p> <p>7h.) Disassemble, clean and inspect Differential Assembly</p> <p>7g.) Re-assemble, adjust and replace Differential Assembly.</p> <p>7h.) Diagnose and determine needed repairs on Transfer Case.</p> <p>7i.) Disassemble, inspect, and clean Transfer Case.</p> <p>7j.) Diagnose and determine needed repairs</p>	50	40	7	

	<p>on Hub Assemblies. 7k.) Re-assemble and adjust Hub Assemblies. 7l.) Replace Hub Assembly into 4-wheel drive unit.</p>				
<p>8. Automatic Transmission/Transaxle Systems: An introduction: In-car Transmission/Transaxle diagnostics and Maintenance procedures Off-car Transmission/Transaxle Diagnostics and Repair.</p>	<p>8a.) Diagnose and conduct performance test to determine needed repair to automatic transmission/transaxle unit. 8b.) Service automatic transmission and cooler. 8c.) Perform adjustments to automatic transmission. 8d.) Inspect, adjust, and replace sensors, cables, and actuators. 8e.) Inspect and replace external bushings, seals, and gaskets. 8f.) Inspect, replace and align power train mounts. 8g.) Remove, disassemble, and clean transmission/transaxle assembly off vehicle. 8h.) Clean and inspect oil pump and converter. 8i.) Clean and inspect gear train, shafts, bushings, and case. 8j.) Clean and inspect friction and reaction units. 8k.) Reassemble automatic transmission/transaxle assembly, check endplay and adjustments made. 8l.) Install transmission/transaxle assembly.</p>	50	50	8	
<p>9. Heating and Air Conditioning Units: An introduction to: Air Conditioning and Heating Systems.</p>	<p>9a.) Diagnose and conduct performance tests to air conditioning unit and determine needed repairs. 9b.) Clean, inspect and repair air conditioning components. 9c.) Evacuate and charge air conditioning system. 9d.) Conduct follow-up performance test. 9e.) Diagnose and repair automatic and electrical temperature control nits. 9f.) Diagnose and determine repairs needed to heating systems. 9g.) Inspect and replace heating system components.</p>	40	30	10	

9 COURSE OUTLINE:

b) CAREER PERFORMANCE STANDARDS

- i) EXPECTED STUDENT OUTCOMES
- ii) HOURS OF INSTRUCTION

COURSE OUTLINE

CAREER PERFORMANCE STANDARDS	EXPECTED STUDENT OUTCOMES	HOURS
Instruction will include:	Student will be able to:	
<p>1. Personal Skills</p> <ul style="list-style-type: none"> ▪ Classroom policies & procedures ▪ Ethics <ul style="list-style-type: none"> → Work → Business ▪ Sexual harassment laws ▪ Personal skills, including positive attitude, self-confident, honesty, perseverance & self-discipline ▪ Professional appearance ▪ Time management ▪ Lifelong learning 	<p>1. Understand how personal skill development, including positive attitude, honesty, self-confidence, time management, & other positive traits affect employability.</p> <ul style="list-style-type: none"> ▪ Demonstrate and understand classroom policies & procedures ▪ Define work and business ethics & demonstrate the importance of ethical standards & social responsibilities in the business environment. ▪ Discuss the laws applicable to sexual harassment & discuss tactics for handling harassment situations. ▪ Demonstrate personal skills in class and/or business environment: <ul style="list-style-type: none"> → Positive attitude → Self-confidence → Honesty → Perseverance → Self-discipline ▪ Demonstrate and model personal hygiene and acceptable professional attire ▪ Prioritize tasks and meet deadlines ▪ Explain the importance of lifelong learning 	<p>Integrated in content area skills</p>

CAREER PERFORMANCE STANDARDS	EXPECTED STUDENT OUTCOMES	HOURS
Instruction will include:	Student will be able to:	
2. Interpersonal Skills <ul style="list-style-type: none"> ▪ Group dynamics ▪ Conflict resolution and negotiation ▪ Team work ▪ Etiquette across gender and cultural groups 	2. Understand principles of effective interpersonal skills, including group dynamics, conflict resolution, and negotiation. <ul style="list-style-type: none"> ▪ Identify and explain the key concepts of group dynamics ▪ Discuss and demonstrate the dynamics of conflict resolution and negotiation, and their importance within the business environment ▪ Demonstrate effective teamwork, share responsibilities, accept supervision and assume leadership roles ▪ Demonstrate cooperative working relationships and proper etiquette across gender and cultural groups 	Integrated in content area skills
3. Thinking and Problem-Solving Skills <ul style="list-style-type: none"> ▪ Critical and creative thinking skills ▪ Logical reasoning and problem-solving skills ▪ Numerical estimation, measurement, and calculation ▪ Identify, locate, and organize needed information and propose, evaluate, and select alternative solutions 	3. Understand the importance of critical thinking and problem-solving skills in the workplace. <ul style="list-style-type: none"> ▪ Apply critical and creative thinking skills in a work environment and implement a plan of improvement as needed ▪ Demonstrate logical reasoning and problem solving skills in a work environment ▪ Apply numerical estimation, measurement and calculation skills to business applications including the following: <ul style="list-style-type: none"> → Whole number math → Decimals & fractions → Counting & monetary functions → Use of tables & graphs ▪ Recognize problem situations; identify, locate and organize needed information, and propose, evaluate and select from alternate solutions 	Integrated in content area skills

CAREER PERFORMANCE STANDARDS	EXPECTED STUDENT OUTCOMES	HOURS
Instruction will include:	Student will be able to:	
4. Communication Skills <ul style="list-style-type: none"> ▪ Written communications ▪ Verbal and Nonverbal communications ▪ Active and effective listening ▪ Proper etiquette in business communications ▪ Writing and editing skills ▪ Use of reference material and handbooks ▪ Oral presentations 	4. Understand principles of effective communication. <ul style="list-style-type: none"> ▪ Read and implement written instructions, technical manuals, written communication, and reference books ▪ Present a positive image of verbal and nonverbal communication through use of appropriate methods ▪ Demonstrate active and effective listening skills through verbal, nonverbal and written feedback ▪ Demonstrate proper etiquette in business communications, including an awareness of requisite for international communications (languages, customs, and time zones) ▪ Demonstrate the following writing and editing skills: <ul style="list-style-type: none"> → Use correct grammar, punctuation, capitalization, vocabulary and spelling → Write, proofread and edit → Select and use appropriate forms of communication ▪ Exhibit a proficiency in the use of reference materials such as dictionary, thesaurus, telephone directory, almanac, zip code directory, and office handbooks 	Integrated in content area skills
5. Occupational Safety <ul style="list-style-type: none"> ▪ Good safety practices 	5. Understand occupational safety issues, including avoidance of physical hazards <ul style="list-style-type: none"> ▪ Model and implement good safety practices including: <ul style="list-style-type: none"> → Avoidance and reporting of physical hazards in the work environment → Safe operation of equipment → Proper handling of hazardous materials 	Integrated in content area skills

CAREER PERFORMANCE STANDARDS	EXPECTED STUDENT OUTCOMES	HOURS
Instruction will include:	Student will be able to:	
<p>6. Employment Literacy</p> <ul style="list-style-type: none"> ▪ Expand awareness of career opportunities ▪ Set employment goals and objectives ▪ Aptitudes, personal characteristics and interests ▪ Develop portfolio to C-TAP standards ▪ Develop interviewing techniques 	<p>6. Understand career paths and strategies for obtaining employment.</p> <ul style="list-style-type: none"> ▪ Explore career opportunities and develop a career plan ▪ Identify steps for setting goals and writing personal goals and objectives ▪ Examine aptitudes related to career options; relate personal characteristics and interests to educational and occupational opportunities ▪ Develop a portfolio to include the following: <ul style="list-style-type: none"> → Letter of Introduction → Cover letter → Resume → Thank you letter → Job application → Licenses, Certificates and Awards → Transcripts → Letters of Recommendation → Work Samples 	<p>Integrated in content area skills</p>
<p>7. Technology Literacy</p> <ul style="list-style-type: none"> ▪ Apply Industry specific technology ▪ Use Industry specific software ▪ Demonstrate Keyboarding ▪ Accessing information ▪ Lifelong enhancement of technology skills 	<p>7. Understand and adapt to changing technology.</p> <ul style="list-style-type: none"> ▪ Identify and demonstrate use of appropriate technology ▪ Identify and use industry specific software ▪ Demonstrate proficiency in alphanumeric keyboarding ▪ Input and retrieve information ▪ Understand the importance of lifelong learning in adapting to changing technology 	<p>Integrated in content area skills</p>

10. ADDITIONAL RECOMMENDED /OPTIONAL ITEMS

- a. ARTICULATION:** Hartnell Community College

- b. VOCATIONAL CREDIT:** 10 credits per semester

- c. ACADEMIC CREDIT:** None at this time

- d. INSTRUCTIONAL STRATEGIES:** Individual, small and large group interaction, peer training,
Lab Hands on instruction, cooperative learning

- e. INSTRUCTIONAL MATERIALS:** Automotive Technology 3rd Edition

- f. CERTIFICATES:** Certificate of Completion with skill level identified