GREAT PLAINS TECHNOLOGY CENTER
COURSE OF STUDY

Career Cluster: Transportation, Distribution and Logistics (TR)

Career Pathway: Automotive Service (TR008)

Career Major: Automotive Service Technician (NATEF Compliant) (TR0080025)

Career Major Hours: Secondary Students: 1050 Hours
Adult Students: 1050 Hours

Instructors:

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Academic Credit: Secondary Students: 3 high school credits per year
Adult Students: Transcript

Prerequisites: None

Career Major Description:
According to the most recent NATEF Automotive Service Technician standards, students in this major will cover the skills necessary to become an entry-level technician. Students will concentrate on courses in introduction, brakes, steering & suspension, electrical / electronics, engine performance, heating & air conditioning, engine repair, automatic transmission, and manual drive train and axles. They will learn how to diagnose and complete brake service, perform vehicle steering and suspension alignment, as well as electrical theory, electrical/ electronic diagnostics. Students will cover engine performance diagnostics and techniques for repair using a variety of diagnostic equipment. This career major includes automotive heating, air conditioning and the student will learn how to evacuate and recharge air-conditioning systems using the proper refrigerant, as well as diagnostics of the heat and A/C system. Students will use advanced diagnostic and repair equipment to troubleshoot complex automotive systems. This career major is intended to provide courses closely aligned with NATEF hours and tasks. ASE certification is recommended and industry recognized.

Career Major Goals:
Students enrolled in this career major will be given the opportunity to develop the skills and attitudes needed to successfully enter the Automotive Service field according to their personal choice, ability, and resourcefulness.

Upon achieving the goals of this career major, students will:

- Become competent in the fundamental skills of the occupation.
- Become qualified for further related education and/or entry into the job market.
- Develop the ability to work with limited or no supervision.
- Accept and abide by the rules and regulations established by the school and/or place of employment.

Related Career Opportunities:

- Automotive Service Technician
- Lube/Quick Lane Technician
- Shop Foreman

- Service Advisor
- Parts Salesperson

Career Major Objectives:

After successful completion of this career major, the student will be able to:

- Demonstrate skills necessary for employment as an Entry Level Automotive Service Technician.
- Utilize basic automotive hand tools and shop equipment in a safe manner.
- Diagnose, test, troubleshoot, and repair basic automotive systems according to National Institute for Automotive Service Excellence Standards.

Career Major Course Sequence:

- HS Student and Part-time Adult (Year One): Course Sequence I
- HS Student and Part-time Adult (Year Two): Course Sequence II
- Full-time Adults (Year One): Course Sequence I and II

DESCRIPTION OF COURSES
SEQUENCE I

Course #	Course Name	HST	HSL	ADT	ADL

TI01609 Fundamentals of Automotive Service 35 10 35 10

This course covers occupational health and safety and tools and equipment identification, usage and operation. The student will receive instruction in the storage, handling, and use of Hazardous Materials. The student will learn to write work orders and warranty reports. The student will learn about the history, current state and future of the automotive service industry. This course will cover dealership and independent operations. The student will learn vehicle identification and how to look up service information using several different sources. The student will learn vehicle maintenance, which will include fluid level checks and adjustments, peripheral electrical system checks and tire inspection and air pressure adjustment. In this course the student will learn basic measuring instruments used in vehicle service and diagnosis, as well as communication skills used throughout the automotive service industry.

TI01740 Automotive Engine Repair 60 70 60 70

In accordance with the most recent NATEF Automobile Service Technology task list, in this course the student will learn common fastener and thread repair to include broken bolt removal, restoration of internal and external threads and proper use of a thread insert. The student will learn to inspect the engine assembly for fuel, oil, coolant and other leaks and determine necessary action. The student will also verify proper operation of instrument panel and warning lamps. The student will identify hybrid vehicle service precautions. Also, in this course are engine oil service and engine accessory drive belt inspection and service as well as inspection of auxiliary coolers and determine necessary action. The student will learn to perform in general engine vacuum tests and general cylinder tests and to determine necessary action. The student will learn proper installation procedures of gaskets and seals on pans and covers using correct sealers and gaskets. The student will also learn to perform oil pressure tests, as well as to test and replace thermostats, water pumps, radiators and fan clutches. The student will also learn to inspect, test and replace oil and water sending units and switches. The student will also learn to inspect and determine action needed for pushrods, rocker arms, rocker arm pivots and shafts as well as valve adjustments. Also covered in this course will be cylinder head and valve train component removal and reinstallation as well as inspection including casting cracks, gaskets and bolts, lifters and camshafts as well as drive gears and timing belts/chains.

TI01737 Automotive Steering & Suspension 45 50 45 50

In accordance with the most recent NATEF Automobile Service Technology task list, the student will learn about the steering and suspension components and quick checks for these components. Student will cover inspection, diagnosis and repair of shocks and struts. Also covered will be mounting and repair of tires and balancing of tire and wheel assembly as well as tire pressure monitoring system (TPMS) diagnosis and service. This course includes various steering system diagnosis and repair or replacement operations, including the power steering pump, tie rod ends, pitman arms, relay rods, steering dampeners, power and manual steering racks and steering gears. This course will also cover electric power-assisted steering systems and inspection thereof. Also covered will be front and rear suspension systems diagnosis and repair, including inspecting and replacement of components. Students will also learn to perform wheel alignments and how to diagnose wheel alignment issues as well as diagnosis and repair steering columns, and how to disable and enable the Supplemental Restraint System (SRS).

TI01719 Automotive Brakes 45 50 45 50

In accordance with most recent NATEF Automobile Service Technology task list, this course covers braking system components, checking and adjusting brake fluids, checking wheel cylinders and adjusting parking brakes. The student will learn to check and replace brake pads, as well as to check and replace brake linings.The student will learn to diagnose and repair drum and disc brake systems. Also covered will be diagnosing and repairing the entire hydraulic brake system, which will include the master cylinder, lines and proportioning valves and stop light operation. The student will learn to diagnose and repair power assist units. Finally this course will cover diagnosis and service of wheel bearings, to include how to replace bearings and races, as well as clean, repack and adjust wheel bearings.The student will learn to Identify and inspect brake, traction, and stability control components and determine necessary action. Also covered will be the description of a regenerative braking system.

TI01741 Automotive Heating and Air Conditioning 30 40 30 40

In accordance with the most recent NATEF Automobile Service Technology task list, this course covers the proper use and maintenance of refrigerant handling equipment. This course covers the automotive heating systems, air conditioning systems, parts identification and function, and system operations. Also in this course the student will cover the refrigerants used in air conditioning systems and identification thereof as well as evacuate and recharge air-conditioning systems using the proper refrigerant. Temperature control components and proper operation of automatic as well as semi-automatic systems will also be identified. The student will learn to inspect heater ducts, doors, hoses, cabin filters and outlets and perform necessary action. The student will learn about the cooling system components, identifying coolant type, checking and adjusting coolant levels as well as checking and replacing coolant hoses. The student will learn to evaluate and determine necessary action for compressor and clutch assemblies, and how to perform the replacement of these parts. The student will learn to perform component replacement, such as the receiver drier, expansion valve, orifice tube, hose assemblies and o-rings. The student will learn to troubleshoot heating and air-conditioning systems operation and how to evaluate climate control systems. This course covers mechanical, electrical and vacuum controls. The student will also learn to diagnose air conditioning system failure concerns, such as the protection device interrupt system, temperature control problems, climate control systems, electrical controls for heating and ventilation, load cut-off systems and other climate control malfunctions as well as A/C system odors. Furthermore, the student will be required to identify hybrid vehicle A/C system electrical circuits and service/safety precautions.

TI01743 Automotive Manual Drivetrain and Axles 35 45 35 45

In accordance with the most recent NATEF Automobile Service Technology task list, students in this course will identify and interpret drive train concerns and determine necessary action. The student will check fluid condition, check for leaks, drain and refill manual transmission/transaxle and final drive unit. The student will diagnose clutch noise, binding, slippage, pulsation, chatter and determine proper

corrective action. Also, the student will inspect all shift linkage and clutch control components including pedal linkage, cables, automatic adjusters, brackets and bushings, pivots, springs, and determine necessary action. The student will check fluid level of clutch master cylinder and bleed hydraulic system. The student will inspect flywheel for wear and cracks, measure flywheel runout and crankshaft endplay and determine necessary action. The student will explain characteristics of an electronically-controlled manual transmission/transaxle. The student will diagnose CV joint and U-joint noise and vibration concerns, determine and perform necessary action. The student will inspect, service and replace front wheel drive (FWD) bearings, hubs seals, shafts, yokes, boots, CV joints as well as check shaft balance, phasing, measure shaft runout, measure and adjust driveline angles. The student will clean and inspect differential housing and housing vent, check for leaks, drain, refill and adjust differential housing fluid level. The student will inspect and replace companion flange, pinion seal and measure companion flange runout. The student will inspect and replace drive axle wheel studs, drive axle shafts, seals, bearings and retainers as well as measure axle flange runout and shaft endplay and determine necessary action. The student will inspect, adjust and repair mechanical, electrical and vacuum shifting controls, bushings, mounts, levers and brackets as well as inspect front wheel bearings and locking hubs on a four-wheel/all-wheel drive vehicle. The student will also identify concerns related to variations in tire circumference and/or final drive ratios.

TI00802 Workforce Staging I **10 0 10 0**

This course is designed to be delivered as an integrated component within the courses taken by the individual student. The course is designed for the development of leadership, personal development and employability skills.

Sequence I Subtotal Hours:	**Theory**	**Lab**	**Total**
High School Student:	260	265	525
Adult Student:	260	265	525

DESCRIPTION OF COURSES
SEQUENCE II

Course #	**Course Name**	**HST**	**HSL**	**ADT**	**ADL**
TI01738	**Automotive Electrical & Electronics**	**100**	**130**	**100**	**130**

In accordance with the most recent NATEF Automobile Service Technology task list, the student will learn battery testing and maintenance. This course will cover electrical theory and Digital Volt Ohm Meter (DVOM) operation. The student will learn basic system checks using a DVOM. Students will learn soldering techniques for wiring and other connections. Also, the student will study general electrical system diagnosis. The student will learn to check voltage drop on circuits, locate shorts, test grounds, test relays and circuit breakers and then determine necessary action. The student will learn to diagnose and repair starting systems, charging systems as well as horn and windshield wiper systems. The student will also learn to diagnose and repair lighting circuits, sockets and controllers. Also covered in this course will be gauges, warning devices, drivers information system and sending units for gauges. The student will cover diagnosing and repairing various accessory circuits. This course will cover the Supplemental Restraint Systems (SRS) service as well as safety procedures to prevent accidental deployment. Students will also check for module communication errors, including the Controller Area Network (CAN) with the use of a scan tool.

TI01739 Automotive Engine Performance 85 100 85 100

In accordance with the most recent NATEF Automobile Service Technology task list, the student will learn to perform basic engine tune-up operations, such as checking and changing spark plugs, checking emission system, checking and servicing of PVC system. The student will learn about the fuel system components, checking and changing the fuel and air filters, inspection and testing of fuel injectors, verification of idle control operation as well as checking and refilling diesel exhaust fluid (DEF). The student will learn to perform diagnostic techniques and determine necessary action from cylinder leakage tests, compression test and power balance tests. In this course the student will learn to retrieve and record diagnostic codes, OBD monitor status, freeze frame data and clear DTC's when applicable. In ignition systems diagnosis and repair the student will learn about no-start, drivability and emission concerns on vehicles with electronic ignition systems. The student will learn to test and/or replace ignition control module, power train/engine control module and reprogram as necessary, inspect/test crankshaft and camshaft position sensor(s). In this course the student will test fuel pressure regulation systems, inspect the exhaust system, perform exhaust back-pressure test and determine necessary action as well as test the electrical components of the fuel system. In the emission system this course covers the exhaust gas recirculation (EGR) system, evaporative emissions control system. The student will learn to perform diagnosis using gas analyzer, and engine diagnostic equipment. The student will learn to diagnose the cause of emissions or drivability problems resulting from failure of computerized engine controls, power control module (PCM) and interrelated systems. This course also covers diagnostic and repair action for no-start situations, engine misfire, stalling, poor mileage, flooding and hesitation on vehicles with injection type fuel systems. The student will learn to inspect and test the operation of turbochargers and superchargers and determine necessary action. The student will cover drivability problems resulting from exhaust gas recirculation (EGR) failure, catalytic converter systems as well as failure of the evaporative control system. Student will learn to check for module communication errors using a scan tool on CAN/BUS systems.

TI01742 Automotive Automatic Transmission and Transaxle 40 40 40 40

In accordance with the most recent NATEF Automobile Service Technology task list, students in this course will learn about the components of the automatic transmission. The student will learn to drain and replace automatic transmission fluid, check and adjust fluid levels on a transmission/transaxle with and without a dipstick. The student will learn to identify and interpret transmission/transaxle concerns and differentiate from an engine performance concern and determine necessary action. The student will perform pressure tests and diagnose pressure concerns using hydraulic principles (Pascal's law). Also the student will diagnose transmission/transaxle gear reduction/multiplication concerns using driving, driven and held member (power flow) principles. The student will also perform stall test and lock-up converter system tests and determine necessary action. The student will inspect, adjust and replace external manual valve linkage, transmission range sensor/switch as well as inspect for fluid loss and replace external seals, gaskets and bushings. Also covered in this course are off-vehicle transmission/transaxle repairs including removal and re-installation of torque converter, inspect engine core/freeze plugs, rear crankshaft seal, alignment dowels and mating surfaces. The student will inspect, leak test and flush cooler lines and fittings. The student will describe operational characteristics of continuously variable transmission (CVT) and hybrid vehicle drivetrain

TI068GP Workforce Staging II 30 0 30 0

This course is designed to be delivered as an integrated component within the courses taken by the individual student. The course is designed for the development of leadership, personal development and employability skills.

Sequence II Subtotal Hours:	Theory	Lab	Total
High School Student:	255	270	525
Adult Student:	255	270	525

Career Major Total:	Theory	Lab	Total
High School Student:	515	535	1050
Adult Student:	515	535	1050

Evaluation Policy:

Employability Grades (100 points per week; 50% of final grade)
The employability skills grade is based on 20 points per day (which may include: attitude, attendance, safety, punctuality, cooperation, participation, clean-up, class preparation, school/classroom rules, and time management). Points will be deducted if these responsibilities are not met at the instructor's discretion. Students will be allowed to make up unearned employability points for **excused** absences only. Full credit will be given for assignments/tests that have been made up (see Student Handbook).

Performance Grades (25% of final grade)

- Live projects
- Homework
- Written Assignments

Test Grades (25% of final grade)

- Test grades will be based on a 100-point scale.
- Test grades include written and/or skills tests.
- A test will be given for each unit of instruction.
- Tests are to be taken as a unit is completed.
- Tests must be completed within allotted time.

Final Grade (9 Weeks Period)
9-weeks grade will be calculated by averaging grades in each category and summing each category according to their assigned weight. Progress reports will be sent to home schools at six and twelve-week intervals each semester as required or requested. Grades are accessible on-line at http://sonisweb.greatplains.edu/studsect.cfm

Grading Scale:
The grading scale as adopted by the Board of Education is as follows:

A = 90 – 100
B = 80 – 89
C = 70 – 79
D = 60 – 69
F = Below 60

W = Withdrawn
I = Incomplete
N = No Grade (Refer to Student Handbook)

Make-Up Work Policy:
All Make-Up Work Is The Responsibility Of The Student. Make-up work will be handled as specified in the Student Handbook. Please be sure to read and understand all student policies, especially make-up of assignments, tests and employability due to absences. Students should always arrange for any make-up work with the instructor as per the Student Handbook. Students should keep track of his or her progress and grades.

Attendance Policy:
For specific information related to attendance and tardiness refer to the Student Handbook. Students should keep a written record of their absences and tardiness.

Course Requirements and Expectations:
The general course requirements and expectations include:

- Teaching methods consist of lecture, on-line and "hands on" projects.
- The student must demonstrate the ability to apply safety to all aspects of the auto service field.

Student Behavior Includes:

- Safety glasses **must** be worn at all times when in the shop area
- Coveralls (navy blue) must be worn at all times in the shop area.
- Name badges must be worn at all times.
- Follow all rules and regulations of Great Plains Technology Center.

NOTE: For additional information or questions regarding the GPTC School policies and procedures, please refer to the Student Handbook and/or the Instructor.

Industry Alignments:

- National Institute for Automotive Service Excellence (ASE)
- Automotive Youth Education System (AYES)
- National Automotive Technicians Education Foundation (NATEF)

Certification Outcomes:

Tier 1 – Certifications Recognized, Administered and/or Endorsed by Industry

- ASE: Automobile: STUDENT: Automatic Transmission and Transaxle
- ASE: Automobile: STUDENT: Automobile Service Technology (2264)
- ASE: Automobile: STUDENT: Brakes
- ASE: Automobile: STUDENT: Electrical/Electronic Systems
- ASE: Automobile: STUDENT: Engine Performance
- ASE: Automobile: STUDENT: Engine Repair
- ASE: Automobile: STUDENT: Heating and Air Conditioning
- ASE: Automobile: STUDENT: Maintenance and Light Repair (2064)
- ASE: Automobile: STUDENT: Suspension and Steering

Tier 2 – Certifications Endorsed by Industry Organizations

- ODCTE: Automatic Transmission/Transaxle Technician (2101)
- ODCTE: Brakes Technician (2102)
- ODCTE: Electrical/Electronics System Technician (2103)

- ODCTE: Engine Performance Technician (2104)
- ODCTE: Heating & Air Conditioning Technician (2105)
- ODCTE: Suspension & Steering Technician (2106)

CIP Code and SOC Code Crosswalk:

- CIP Code – 47.0604
- SOC Code – 49-3023.00

Instructional Materials and Supplies:

Students are not required to purchase textbooks or supplemental materials.

eLearning Curriculum:

CDX online. *CDXsite.com.* Jones & Bartlett Learning LLC., 2014. Web. <http://lv2014.gptc.cdxsite.com/>

Textbooks:

Duffy, James E. Modern Automotive Technology. 8th ed. 978-1-61960-370-7. Tinley Park: Goodheart-Wilcox, 2014