



AUTOMOTIVE ENGINE PERFORMANCE FUNDAMENTALS (II) Course Syllabus

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Course Number:	EP102	Instructor:	Ron Rader
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Course Length:	105 hours	Email:	rrader@nwtech.edu
Career Cluster:	Transportation	Campus:	Alva, OK
Career Pathway:	Automotive Service	Program:	Automotive Service Technology
Career Major:	Automotive Service Technician, Automotive Drivability Technician		
Pre-requisite:	Automotive Introduction, Automotive Engine Performance Introduction		
Course Description:	<p>In this course the student will learn to perform diagnostic techniques and determining necessary action from cylinder leakage tests, compression test and power balance tests. In this course the student will learn to retrieve, record, diagnose and clear diagnostic codes from OBD I and II electronic systems. In ignition systems diagnosis and repair the students will learn about no-start, drivability and emission concerns on vehicles with electronic ignitions (distributorless) and distributor ignition systems. Students will learn to test, inspect and determine repair primary circuit wiring, distributor performance, ignition coils, pick-up sensors and triggering devices and ignition control modules. In this course the student will test fuel pressure regulation systems, service the throttle body, inspect the exhaust system and perform necessary action as well as test the electrical components of the fuel system. In the emission system this course covers positive crankcase ventilation (PCV) system, the exhaust gas recirculation (EGR) system, intake air temperature control system as well as the evaporative emissions control system.</p>		
Instructional Philosophy:	To provide a training program that is of merit both educationally and ethically while effectively providing the individual learner the opportunities, knowledge and skills necessary to succeed in the workplace as well as life.		
Course Goals:	Upon successful completion of this course, the student will be able to:		
	Competencies:		
	General Engine Diagnosis		
	Interpret and verify concern; determine necessary action.		
	Diagnose unusual engine noise or vibration concerns; determine necessary action.		
	Diagnose unusual exhaust color, odor, and sound; determine necessary action.		
	Perform engine absolute (vacuum/boost) manifold pressure tests; determine necessary action.		
	Perform cylinder power balance test; determine necessary action.		
	Perform cylinder compression test; determine necessary action.		
	Perform cylinder leakage test; determine necessary action.		
	Computerized Engine Controls Diagnosis and Repair		
	Retrieve and record stored OBD I diagnostic trouble codes; clear codes.		
	Retrieve and record stored OBD II diagnostic trouble codes; clear codes.		
	Obtain and interpret digital multi-meter (DMM) readings.		
	Access and use electronic service information (ESI).		
	Locate and interpret vehicle and major component identification numbers (VIN, vehicle certification labels, and calibration decals).		

Inspect and test power and ground circuits and connections; service or replace as needed.

Practice recommended precautions when handling static sensitive devices.

Perform active tests of actuators using scan tool; determine necessary action.

Ignition System Diagnosis and Repair

Diagnose no-starting, driveability, and emissions concerns on vehicles with electronic ignition (EI/DIS)(distributorless) systems; determine necessary action.

Diagnose no-starting, driveability, and emissions concerns on vehicles with distributor ignition (DI) systems; determine necessary action.

Inspect and test ignition primary circuit wiring and components; perform necessary action.

Inspect and test distributor; perform necessary action.

Inspect and test ignition coil(s); perform necessary action.

Inspect and test ignition system pick-up sensor or triggering devices; perform necessary action

Inspect and test ignition control module; perform necessary action.

Fuel, Air Induction, and Exhaust Systems Diagnosis and Repair

Inspect and test fuel pressure regulation system and components of injection-type fuel systems; perform necessary action.

Inspect and test cold enrichment system and components; perform necessary action.

Remove, service, and install throttle body; adjust related linkages.

Adjust idle speed and fuel mixture

Remove, inspect, and test vacuum and electrical circuits, components and connections of fuel system; perform necessary action

Inspect exhaust manifold, exhaust pipes, muffler(s), catalytic converter(s), resonator(s), tail pipe(s), and heat shield(s); perform necessary action

Perform exhaust system backpressure test; determine necessary action.

Emissions Control Systems Diagnosis and Repair

Positive Crankcase Ventilation

Diagnose oil leaks, emissions, and driveability problems resulting from failure of the positive crankcase ventilation (PCV) system; determine necessary action

Exhaust Gas Recirculation

Inspect and test valve, valve manifold, and exhaust passages of exhaust gas recirculation (EGR) systems; perform necessary action.

Inspect and test vacuum/pressure controls, filters, and hoses of exhaust gas recirculation (EGR) systems; perform necessary action.

Inspect and test electrical/electronic sensors, controls, and wiring of exhaust gas recirculation (EGR) systems; perform necessary action.

Exhaust Gas Treatment

Inspect and test mechanical components of secondary air injection systems; perform necessary action.

Inspect and test electrical/electronically-operated components and circuits of air injection systems; perform necessary action.

Inspect and test components of catalytic converter systems; perform necessary action.

Intake Air Temperature Controls

Inspect and test components of intake air temperature control system; perform necessary action.

Early Fuel Evaporation (Intake Manifold Temperature) Controls

Inspect and test components of early fuel evaporation control system; perform necessary action.

Evaporative Emissions Controls

Diagnose emissions and driveability problems resulting from failure of evaporative emissions control system; determine necessary action.
Inspect and test components and hoses of evaporative emissions control system; perform necessary action.

Engine Related Service

Adjust valves on engines with mechanical or hydraulic lifters.
Verify correct camshaft timing; determine necessary action.
Inspect and test thermostat, by-pass, and housing; perform necessary action.
Inspect and test mechanical/electrical fans, fan clutch, fan shroud/ducting, air dams, and fan control devices; perform necessary action.

Major Course Projects:

Students will perform tasks relating to the Automotive Service Industry as per standards identified by the National Automotive Technicians Education Foundation (NATEF). Students will complete repair orders each day and will document completion of competencies on competency profiles tracking individual progress and accomplishment. Projects will include performing tasks on mock ups, shop vehicles, and live work as student skills progress. These projects will reinforce classroom theory instruction and will require the student to consult industry service information during the course of task performance.

Project Outline:

Instructional Delivery Plan:

The instruction for this course will be comprised of multiple methods designed to promote and accommodate different learning styles including classroom lecture, classroom demonstrations, shop demonstrations, hands on learning activities, classroom discussion, interactive media, textbook, computer based learning activities, research projects, guest speakers, student presentations, and interactive learning with CPS (Classroom Performance System). Students will be required to practice the skills associated with the instructional content and will be required to work independently and also in teams. Assignments will require students to use academic skills in math, science, and language arts.

Assessment Plan:

Students will be assessed according to three basic kinds of learning. Knowledge: Does the student possess the required knowledge to perform a specific competency? Skills: Does the student possess the necessary coordination to perform the task/competency? Attitude: Will the student perform the task/competency on the job after learning to do it? Students will also be assessed according to the basic work skills of attendance and promptness. Soft skills will be assessed in the Academic Career Center.

- 50% Daily work- Performance of technical skills on job, work habits, safety, clean-up, participation
- 50% Written assignment- Repair orders, textbook assignments, etc.

Grading Scale:

- A 90-100 Exceeds expectations
- B 80-89 Meets industry standards and expectations
- C 70-79 Passing grade, but does not meet some standards
- D 60-69 Passing, but only meets the minimum standards
- F Below 60 Failing, does not meet minimum standards

Alliance Credit Offered:

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Industry Alignments:

ASE Certification, ODCTE Certification,

**End of Instruction
Industry
Assessment:**

ASE Certification, ODCTE Certification,

Resources:

Automotive Excellence Vol. 1 and Vol. 2
Modern Automotive Technology
Introduction to Automotive Service: Fundamental Concepts
CDX Global Interactive Training
Snap On Shop Key
Alldata

Attachments:

See Automotive Service Technology Task List Competency Handbook