



Wayne County Community College District

COURSE SYLLABUS

AUT 119 Engine Performance II

CREDIT HOURS: 3.00

CONTACT HOURS: 60.00

COURSE DESCRIPTION:

This course is a continuation of AUT 118 and is designed to help the student identify the complex engine and computer control systems on the modern automobile. Basic troubleshooting procedures will be used to diagnose the engines electrical, ignition, fuel and emissions systems. Other areas such as ASE certification techniques will also be introduced in this course.

PREREQUISITES: AUT 114, AUT 115, AUT 116, AUT 117, AUT 118

EXPECTED COMPETENCIES:

Upon successful completion of this course, the student will be able to:

Shop Safety

For every task in Engine Performance, the following safety requirements must be strictly enforced: Comply with personal and environmental safety practices associated with clothing; eye protection; hand tools; power equipment; proper ventilation; and handling, storage, and disposal of chemicals/materials in accordance with local, state, and federal safety and environmental regulations.

- **Identify protective clothing and equipment and their proper use; proper shop behavior; principles of fire safety; and federal regulations concerning hazardous material and shop safety.**

Objective

- Describe how to select individual personal protective clothing and equipment.
- Identify the dangers of improper behavior in the shop.
- Identify the importance of proper grooming and hygiene.
- Identify the classes of fires and the types of fire extinguishers.
- Identify the use of a fire blanket.
- Identify general fire emergency procedures.
- Identify the Occupational Safety and Health Administration (OSHA) regulations.
- Identify the Environmental Protection Agency (EPA) regulations.
- Identify the safe use of fire protection equipment
- Identify the safe use of shop equipment following Environmental Protection Agency (EPA) and Occupational Safety and Health Act (OSHA) regulations

- **Identify and explain the safe and proper use of chemicals**

Objective

- Identify the types and uses of solvents.
- Identify the types and uses of soaps and cleaning solutions.
- Identify the types and uses of oils.
- Identify the types and uses of greases.
- Identify the types and uses of specialty additives.
- Identify the types and uses of specialty chemicals.



Wayne County Community College District

COURSE SYLLABUS

- Describe the five general rules for using automotive chemicals.
- Complete the assignment sheet on lubricants.
- Complete the assignment sheet on lubricants.
- Identify gasses and the hazards they present.
- Identify the hazards of asbestos dust.

General Engine Diagnosis

- **Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction. P-1**

Objective

- Identify terms and definitions associated with the evaluation and diagnosis of engine performance problems
- Identify important diagnostic information included in driver complaints

- **Diagnose engine mechanical, electrical, electronic, fuel, and ignition concerns with an oscilloscope and/or engine diagnostic equipment; determine necessary action. P-1**

Objectives

- Identify the terms and definitions associated with basic ignition systems
- Identify the purpose of the ignition system
- Identify the basic components of distributor ignition systems
- Identify the characteristics of electronic ignition systems
- Identify the terms and definitions associated with distributor ignition systems.
- Identify the basic performance capabilities of distributor ignition systems
- Identify the components of breaker point ignition systems
- Identify the principles of electromagnetic induction and how it relates to breaker point ignition systems.
- Identify how breaker point ignition systems operate
- Identify the components of solid-state ignition systems
- Identify the components of computerized ignition systems
- Identify what an electronic ignition system is and the typical operation of the system.
- Identify a wasted-spark electronic ignition system and how it functions
- Identify a unit electronic ignition system and how it functions
- Identify the advantages of an electronic ignition system.
- Identify the difference between electronic and computerized ignition systems.
- Identify the terms and definitions associated with ignition systems
- Identify the procedures for diagnosing engine condition and performance using engine vacuum gauge tests.
- Identify the procedures for diagnosing engine condition and performance using a cranking engine compression test.
- Identify the procedures for diagnosing engine condition and performance using a running engine compression test.
- Identify the procedures for diagnosing engine condition and performance using a cylinder leakage test.
- Identify the procedures for diagnosing engine condition and performance using a cylinder balance test.
- Identify the components and functions of engine analyzers.
- Identify the procedures for operating an oscilloscope.
- Identify oscilloscope patterns.
- Identify primary oscilloscope patterns.
- Identify secondary oscilloscope patterns.



Wayne County Community College District

COURSE SYLLABUS

Ignition System Diagnosis and Repair

- **Diagnose ignition system related problems such as no-starting, hard starting, engine misfire, poor driveability, spark knock, power loss, poor mileage, and emissions concerns on vehicles with electronic ignition (distributorless) systems; determine necessary action. P-1**

Objectives

- Identify the terms and definitions associated with basic ignition systems
 - Identify the purpose of the ignition system.
 - Identify the basic components of distributor ignition systems
 - Identify the characteristics of electronic ignition systems.
 - Identify the terms and definitions associated with distributor ignition systems.
 - Identify the basic performance capabilities of distributor ignition systems.
 - Identify the components of breaker point ignition systems.
 - Identify the principles of electromagnetic induction and how it relates to breaker point ignition systems.
 - Identify how breaker point ignition systems operate.
 - Identify the components of solid-state ignition systems.
 - Identify the components of computerized ignition systems.
 - Identify the procedure for inspecting and testing primary circuit wiring.
 - Identify the procedures for inspecting, testing, and replacing the ignition coils in breaker point and solid-state ignition systems.
 - Identify the procedures for testing, adjusting, and replacing the breaker points and condenser in breaker point ignition systems.
 - Identify the procedures for removing and replacing the distributor in breaker point and solid-state ignitions systems.
 - Identify the procedures for disassembling, inspecting, and reassembling the distributor in breaker point and solid-state ignition systems.
 - Identify what an electronic ignition system is and the typical operation of the system.
 - Identify a wasted-spark electronic ignition system and how it functions.
 - Identify a unit electronic ignition system and how it functions.
 - Identify the advantages of an electronic ignition system.
 - Identify the difference between electronic and computerized ignition systems.
 - Identify the uses of the Hall Effect switch or permanent magnet signal generator.
 - Identify the procedures for testing the primary circuit wiring.
 - Identify the procedures for inspecting, testing, and replacing the coil(s).
 - Identify the procedures for performing a visual engine inspection.
 - Identify the procedures for inspecting the engine exhaust.
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- **Diagnose ignition system related problems such as no-starting, hard starting, engine misfire, poor driveability, spark knock, power loss, poor mileage, and emissions concerns on vehicles with distributor ignition (DI) systems; determine necessary action. P-1**

Objectives

- Identify the terms and definitions associated with distributor ignition systems.
- Identify the basic performance capabilities of distributor ignition systems
- Identify the components of breaker point ignition systems.
- Identify the principles of electromagnetic induction and how it relates to breaker point ignition systems.
- Identify how breaker point ignition systems operate.
- Identify the components of solid-state ignition systems.
- Identify the components of computerized ignition systems.



Wayne County Community College District

COURSE SYLLABUS

- Identify the procedures for inspecting and replacing the distributor cap in breaker point and solid-state ignition systems.
 - Identify the procedures for inspecting and replacing the distributor rotor in breaker point and solid-state ignition systems.
 - Identify the procedures for removing and replacing the distributor in breaker point and solid-state ignitions systems.
 - Identify the procedures for disassembling, inspecting, and reassembling the distributor in breaker point and solid-state ignition systems
 - Identify the procedures for inspecting, testing, and replacing the secondary wiring in breaker point and solid-state ignition systems.
 - Identify the procedures for servicing spark plugs in breaker point and solid-state ignition systems.
 - Identify what an electronic ignition system is and the typical operation of the system.
 - Identify a wasted-spark electronic ignition system and how it functions
 - Identify a unit electronic ignition system and how it functions
 - Identify the advantages of an electronic ignition system.
 - Identify the difference between electronic and computerized ignition systems.
 - Identify the procedures for inspecting, testing, and replacing the coil(s)
 - Identify the procedures for inspecting, testing, and replacing the secondary wiring.
 - Identify the procedures for servicing the spark plugs.
 - Identify the procedures for performing a visual engine inspection
 - Identify the procedures for inspecting the engine exhaust.
- **Inspect and test ignition primary circuit wiring and solid state components; perform necessary action. P-2**
 - Objectives**
 - Identify the terms and definitions associated with distributor ignition systems.
 - Identify the basic performance capabilities of distributor ignition systems
 - Identify the components of breaker point ignition systems.
 - Identify the principles of electromagnetic induction and how it relates to breaker point ignition systems.
 - Identify how breaker point ignition systems operate.
 - Identify the components of solid-state ignition systems.
 - Identify the components of computerized ignition systems.
 - Identify the procedures for testing and adjusting ignition timing in breaker point and solid-state ignition systems.
 - Identify what an electronic ignition system is and the typical operation of the system.
 - Identify a wasted-spark electronic ignition system and how it functions
 - Identify a unit electronic ignition system and how it functions
 - Identify the advantages of an electronic ignition system
 - Identify the difference between electronic and computerized ignition systems.
 - Identify the procedures for checking the timing.
 - Identify the considerations for studying computerized engine controls
 - Identify the terminology associated with computerized engine control systems.
 - Identify the prerequisite knowledge needed for studying computerized engine control systems.
 - Identify the basic characteristics of computerized engine control systems
 - Identify the basic ignition system sensors.
 - Identify the basic characteristics and components of automotive computers
 - Identify the characteristics of the permanent magnet signal generator



Wayne County Community College District

COURSE SYLLABUS

- Identify the characteristics of the Hall Effect sensor.
 - Identify the characteristics of the engine coolant temperature sensor
 - Identify the characteristics of the intake air temperature sensor
 - Identify the characteristics of the throttle position sensor
 - Identify the characteristics of the manifold absolute pressure sensor
 - Identify the characteristics of other sensors.
 - Identify the basic actuators controlled by the engine control module
 - Identify the characteristics of computerized control of base timing
 - Identify the characteristics of computerized control of timing advance
- **Inspect, test and service distributor. P-3**
 - Objectives**
 - Identify the terms and definitions associated with distributor ignition systems.
 - Identify the basic performance capabilities of distributor ignition systems.
 - Identify the components of breaker point ignition systems.
 - Identify the principles of electromagnetic induction and how it relates to breaker point ignition systems.
 - Identify how breaker point ignition systems operate.
 - Identify the components of solid-state ignition systems.
 - Identify the components of computerized ignition systems.
 - Identify what an electronic ignition system is and the typical operation of the system.
 - Identify a wasted-spark electronic ignition system and how it functions.
 - Identify a unit electronic ignition system and how it functions.
 - Identify the advantages of an electronic ignition system.
 - Identify the considerations for studying computerized engine controls
 - Identify the terminology associated with computerized engine control systems.
 - Identify the prerequisite knowledge needed for studying computerized engine control systems.
 - Identify the basic characteristics of computerized engine control systems
 - Identify the basic ignition system sensors.
 - Identify the basic characteristics and components of automotive computers
 - Identify the characteristics of the permanent magnet signal generator
 - Identify the characteristics of the Hall Effect sensor.
 - Identify the characteristics of the engine coolant temperature sensor
 - Identify the characteristics of the intake air temperature sensor
 - Identify the characteristics of the throttle position sensor
 - Identify the characteristics of the manifold absolute pressure sensor
 - Identify the characteristics of other sensors
 - Identify the basic actuators controlled by the engine control module
 - Identify the characteristics of computerized control of base timing
 - Identify the characteristics of computerized control of timing advance
 - Identify the basic steps to diagnosing an engine performance problem
 - Access and interpret diagnostic trouble codes
 - Identify the types of diagnostic equipment
 - Identify the procedures for testing wiring
 - Identify the procedures for checking reference voltage
 - Identify the procedures for checking wiring continuity
 - Identify the procedures for testing wiring with a breakout box
 - Identify the procedures for testing the crankshaft position sensor and other magnetic position sensors.



Wayne County Community College District

COURSE SYLLABUS

- Identify the procedures for testing the Hall Effect sensor.
 - Identify the procedures for testing the engine coolant temperature sensor
 - Identify the procedures for testing the intake air temperature sensor
 - Identify the procedures for testing the throttle position sensor
 - Identify the procedures for testing the manifold absolute pressure sensor
 - Identify the procedures for testing the mass airflow sensor
 - Identify the procedures for testing the knock sensor
- **Inspect and test ignition system secondary circuit wiring and components; perform necessary action. P-2**
 - **Objectives**
 - Identify the terms and definitions associated with distributor ignition systems.
 - Identify the basic performance capabilities of distributor ignition systems
 - Identify the components of breaker point ignition systems
 - Identify the principles of electromagnetic induction and how it relates to breaker point ignition systems.
 - Identify how breaker point ignition systems operate.
 - Identify the components of solid-state ignition systems.
 - Identify the components of computerized ignition systems.
 - Identify what an electronic ignition system is and the typical operation of the system.
 - Identify a wasted-spark electronic ignition system and how it functions
 - Identify a unit electronic ignition system and how it functions
 - Identify the advantages of an electronic ignition system.
 - Identify the difference between electronic and computerized ignition systems.
 - Identify the considerations for studying computerized engine controls
 - Identify the terminology associated with computerized engine control systems
 - Identify the prerequisite knowledge needed for studying computerized engine control systems.
 - Identify the basic characteristics of computerized engine control systems
 - Identify the basic ignition system sensors
 - Identify the basic characteristics and components of automotive computers
 - Identify the characteristics of the permanent magnet signal generator
 - Identify the characteristics of the Hall Effect sensor
 - Identify the characteristics of the engine coolant temperature sensor
 - Identify the characteristics of the intake air temperature sensor
 - Identify the characteristics of the throttle position sensor
 - Identify the characteristics of the manifold absolute pressure sensor
 - Identify the characteristics of other sensors
 - Identify the basic actuators controlled by the engine control module
 - Identify the characteristics of computerized control of base timing
 - Identify the characteristics of computerized control of timing advance
 - Identify the basic steps to diagnosing an engine performance problem
 - Access and interpret diagnostic trouble codes.
 - Identify the types of diagnostic equipment.
 - Identify the procedures for testing wiring.
 - Identify the procedures for checking reference voltage.
 - Identify the procedures for checking wiring continuity.
 - Identify the procedures for testing wiring with a breakout box
 - Identify the procedures for testing the crankshaft position sensor and other magnetic position sensors.



Wayne County Community College District

COURSE SYLLABUS

- Identify the procedures for testing the Hall Effect sensor.
- Identify the procedures for testing the engine coolant temperature sensor
- Identify the procedures for testing the intake air temperature sensor
- Identify the procedures for testing the throttle position sensor
- Identify the procedures for testing the manifold absolute pressure sensor
- Identify the procedures for testing the mass airflow sensor
- Identify the procedures for testing the knock sensor
- **Inspect and test ignition coil(s); perform necessary action. P-1**
Objectives
 - Identify the procedures for inspecting, testing, and replacing the ignition coils in breaker point and solid-state ignition systems.
 - Demonstrate the ability to:
 - A. Test the primary circuit and ignition coil.
- **Check and adjust ignition system timing and timing advance/retard (where applicable). P-3**
Objectives
 - Demonstrate the ability to:
 - A. Test the primary circuit and ignition coil.
 - B. Time an engine using a timing light.
 - C. Time an engine using a timing meter.
 - D. Inspect and replace the breaker points and condenser.
 - E. Remove and replace the ignition distributor
 - Identify the basic actuators controlled by the engine control module
 - Identify the characteristics of computerized control of base timing
 - Identify the characteristics of computerized control of timing advance
- **Inspect and test ignition system pick-up sensor or triggering devices; perform necessary action P-1**
Objectives
 - Demonstrate the ability to:
 - A. Test the primary circuit and ignition coil.
 - B. Time an engine using a timing light.
 - C. Time an engine using a timing meter.
 - D. Inspect and replace the breaker points and condenser.
 - E. Remove and replace the ignition distributor
 - Identify the basic ignition system sensors.

ASSESSMENT METHODS:

Student performance may be assessed by examination, quizzes, case studies, oral conversation, group discussion, oral presentations. The instructor reserves the option to employ one or more of these assessment methods during the course.

GRADING SCALE:

90%-100% = A
80%-89.9% = B
70%-79.9% = C
60%-69.9% = D
<60% = E