



# Wayne County Community College District

## COURSE SYLLABUS

### AUT 117 Electrical/Electronic Systems IV

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**CREDIT HOURS:** 3.00

**CONTACT HOURS:** 60.00

**COURSE DESCRIPTION:**

This course is a required course in the Automotive Technology certificate and associate degree programs. This advanced course provides students with the necessary skills and understanding of advanced inspection, diagnosis & repair of electrical/electronics in automotive vehicles. The student will perform advanced diagnosing, vehicle testing and repair on today's automobiles using the latest testing equipment. Students will perform the necessary service on OBD I & II vehicles with the use of scan tools and analyzers. In addition, sample ASE certification tests and procedures will be implemented and strongly applied in this course. *Lab Fee*

**PREREQUISITES:** AUT 114, AUT 115, AUT 116

**EXPECTED COMPETENCIES:**

Upon completion of this course, the student will be familiar with:

***Shop Safety***

**For every task in Electrical/Electronic Systems, 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



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- **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.
- 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 Electrical System Diagnosis**

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

- Identify the procedures for verifying the customer's concerns.
- Identify terms and definitions associated with the evaluation and diagnosis of electrical/electronic problems
- Identify printed and electronic resources for automotive manuals, manufacturer and supplier updates.
- Identify locations where vehicle identification numbers are found
- Identify important diagnostic information included in driver complaints

- **Locate shorts, grounds, opens, and resistance problems in electrical/electronic circuits; determine necessary action. P-1**

**Objective**

- Identify the equipment used to test electrical circuits.
- Identify the procedures for testing electrical circuits.
- Identify the types of electrical faults.
- Demonstrate the ability to:
  - A. Measure voltage in a circuit.
  - B. Measure resistance in a circuit.
  - C. Measure current in a circuit.
  - D. Determine circuit voltage and continuity using a test light.
  - E. Perform a fault test.
  - F. Check continuity in automotive electrical circuits.
  - G. Check for opens, shorts, and grounds in an automotive electrical circuit



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- H. Measure resistance in an automotive electrical circuit.
- I. Measure volts in an automotive electrical circuit.
- J. Measure current in an automotive electrical circuit.
- K. Inspect and service fusible links, circuit breakers, and fuses in an automotive electrical circuit.
- L. Identify and interpret electrical/electronic system concern

- **Identify location of hybrid vehicle high voltage circuit disconnect (service plug) location and safety procedures. P-2**

***Objective***

- Identify the equipment used to test electrical circuits.
- Identify the procedures for testing electrical circuits.
- Identify the types of electrical faults.
- Demonstrate the ability to:
  - A. Measure voltage in a circuit.
  - B. Measure resistance in a circuit.
  - C. Measure current in a circuit.
  - D. Determine circuit voltage and continuity using a test light
  - E. Perform a fault test.
  - F. Check continuity in automotive electrical circuits.
  - G. Check for opens, shorts, and grounds in an automotive electrical circuit
  - H. Measure resistance in an automotive electrical circuit.
  - I. Measure volts in an automotive electrical circuit.
  - J. Measure current in an automotive electrical circuit.
  - K. Inspect and service fusible links, circuit breakers, and fuses in an automotive electrical circuit.
  - L. Identify and interpret electrical/electronic system concern



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#### *Lighting Systems Diagnosis and Repair*

- **Diagnose the cause of brighter than normal, intermittent, dim, or no light operation; determine necessary action. P-1**

##### ***Objective***

- Identify the procedures for general testing and diagnosis of lighting circuit components.
- Identify the procedures for specific testing and diagnosis of lighting.
- Identify the procedures for servicing the headlights.
- Identify the procedures for servicing the taillights, brake lights, and turn signal lights.

- **Inspect, replace, and aim headlights and bulbs. P-2**

##### ***Objective***

- Identify the procedures for general testing and diagnosis of lighting circuit components.
- Identify the procedures for specific testing and diagnosis of lighting.
- Identify the procedures for servicing the headlights.

- **Inspect and diagnose incorrect turn signal or hazard light operation; perform necessary action P-2**

##### ***Objective***

- Identify the procedures for specific testing and diagnosis of lighting.
- Identify the procedures for servicing the headlights.

- **Identify system voltage and safety precautions associated with high intensity discharge headlights. P-2**

##### ***Objective***

- Identify the procedures for general testing and diagnosis of lighting circuit components.
- Identify the procedures for specific testing and diagnosis of lighting.
- Identify the procedures for servicing the headlights.

#### *Gauges, Warning Devices, and Driver Information Systems Diagnosis and Repair*

- **Inspect and test gauges and gauge sending units for cause of abnormal gauge readings; determine necessary action. P-1**

##### ***Objective***

- Identify the procedures for testing and servicing gauge system components.
- Identify the procedures for testing and servicing the driver information and warning systems.



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- **Inspect and test connectors, wires, and printed circuit boards of gauge circuits; determine necessary action. P-3**

#### ***Objective***

- Identify the driver information and warning systems.
- Identify the procedures for testing and servicing the driver information and warning systems.

- **Diagnose the cause of incorrect operation of warning devices and other driver information systems; determine necessary action. P-1**

#### ***Objective***

- Identify terms and definitions associated with gauges, warning devices, and driver information systems.
- Identify gauge components and circuits.
- Identify the procedures for testing and servicing gauge system components.
- Identify the driver information and warning systems.
- Identify the procedures for testing and servicing the driver information and warning systems.

- **Inspect and test sensors, connectors, and wires of electronic (digital) instrument circuits; determine necessary action. P-3**

#### ***Objective***

- Demonstrate the ability to:
  - A. Test and service intermittent, high, low, or no-gauge reading.
  - B. Test and service the incorrect operation of an indicator light.
  - C. Test and service the incorrect operation of an audible warning system device.

#### ***Horn and Wiper/Washer Diagnosis and Repair***

- **Diagnose incorrect horn operation; perform necessary action. P-1**

#### ***Objective***

- Identify horn system components and circuits.
- Identify the procedures to test and service the horn system.



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- **Diagnose incorrect wiper operation; diagnose wiper speed control and park problems; perform necessary action. P-1**  
*Objective*
  - Identify the procedures to test and service the windshield wiper/washer system.
  
- **Diagnose incorrect washer operation; perform necessary action. P-2**  
*Objective*
  - Identify windshield wiper/washer system components and circuits.
  - Identify the procedures to test and service the windshield wiper/washer system.
  - Demonstrate the ability to:
    - A. Test and service incorrect windshield wiper operation
    - B. Test and service incorrect windshield washer operation

#### *Accessories Diagnosis and Repair*

- **Diagnose incorrect operation of motor-driven accessory circuits; determine necessary action. P-1**  
*Objective*
  - Identify the basics of heated glass systems
  - Identify the basics of the anti-theft system.
  - Identify horn system components and circuits.
  - Identify the procedures to test and service the horn system.
  
- **Diagnose incorrect heated glass, mirror, or seat operation; determine necessary action. P-3**  
*Objective*
  - Identify the basic components of supplemental restraint systems.
  - Identify the basics of the supplemental restraint electrical system.
  - Identify the procedures to identify vehicles equipped with supplemental restraint systems.
  - Identify the procedures to disable and enable a supplemental restraint system.
  - Identify the procedures to visually inspect the supplemental restraint system.
  - Identify the procedures to access and read supplemental restraint system codes.
  - Identify the procedures to service the supplemental restraint system components.



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- **Diagnose incorrect electric lock operation (including remote keyless entry); determine necessary action. P-1**

***Objective***

- Identify the procedures for testing and servicing the electrical convenience accessories.
- Demonstrate the ability to:
  - A. Remove and reinstall the door panels.
  - B. Test and service the power windows.
  - C. Test and service the power seats.
  - D. Test and service the power mirrors.
  - E. Test and service the power door locks
  - F. Test and service the remote keyless entry system.
  - G. Test and service the cruise control system.
  - H. Test and service the radio.
  - I. Diagnose body electronic system circuits.
  - J. Check for module communication errors.

- **Diagnose incorrect operation of cruise control systems; determine necessary action. P-3**

***Objective***

- Identify the procedures for testing and servicing the electrical convenience accessories.
- Demonstrate the ability to:
  - A. Test and service the cruise control system.
  - B. Check for module communication errors.

- **Diagnose supplemental restraint system (SRS) concerns; determine necessary action. P-1**

***Objective***

- Identify the procedures for testing and servicing the electrical convenience accessories.
- Demonstrate the ability to:
  - A. Check for module communication errors.



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- **Disarm and enable the airbag system for vehicle service. P-1**  
*Objective*
  - Identify the procedures for testing and servicing the electrical convenience accessories.
  - Demonstrate the ability to:
    - A. Check for module communication errors.
  
- **Diagnose radio static and weak, intermittent, or no radio reception; determine necessary action. P-3**  
*Objective*
  - Identify the procedures for testing and servicing the electrical convenience accessories.
  - Demonstrate the ability to:
    - A. Test and service the radio.
  
    - B. Diagnose body electronic system circuits.
  
- **Remove and reinstall door panel. P-1**  
*Objective*
  - Identify the procedures for testing and servicing the electrical convenience accessories.
  - Demonstrate the ability to:
    - A. Remove and reinstall the door panels.
  
    - B. Test and service the power windows.
  
    - C. Test and service the power mirrors.
  
    - D. Test and service the power door locks
  
    - E. Test and service the remote keyless entry system.
  
    - F. Diagnose body electronic system circuits.
  
- **Diagnose body electronic system circuits using a scan tool; determine necessary action. P-2**  
*Objective*
  - Identify the procedures for testing and servicing the electrical convenience accessories.
  - Demonstrate the ability to:
    - A. Diagnose body electronic system circuits.
  
    - B. Check for module communication errors.





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- **Check for module communication (CAN/BUS) errors using a scan tool. P-2**  
*Objective*
  - Identify the procedures for testing and servicing the electrical convenience accessories.
  - Demonstrate the ability to:
    - A. Remove and reinstall the door panels.
    - B. Test and service the power windows.
    - C. Test and service the power seats.
    - D. Test and service the power mirrors.
    - E. Test and service the power door locks.
    - F. Test and service the remote keyless entry system.
    - G. Test and service the cruise control system.
    - H. Test and service the radio.
    - I. Diagnose body electronic system circuits.
    - J. Check for module communication errors.
  
- **Diagnose the cause of false, intermittent, or no operation of anti-theft system. P-3**  
*Objective*
  - Identify the procedures for testing and servicing the electrical convenience accessories.
  - Demonstrate the ability to:
    - A. Remove and reinstall the door panels.
    - B. Test and service the power windows.
    - C. Test and service the power seats.
    - D. Test and service the power mirrors.
    - E. Test and service the power door locks.



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F. Test and service the remote keyless entry system.

G. Test and service the cruise control system.

H. Test and service the radio.

I. Diagnose body electronic system circuits.

J. Check for module communication errors.

- **Describe the operation of keyless entry/remote-start systems. P-3**  
*Objective*
  
- **Perform software transfer, software updates, or flash reprogramming on electronic modules. P-3**  
*Objective*

#### **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