Wayne County Community College District

COURSE SYLLABUS

AUT 122 Automatic Transmission & Transaxle I

CREDIT HOURS: 4.00

CONTACT HOURS: 75.00

COURSE DESCRIPTION:
This course is designed to provide students with the necessary skills and understanding to research, diagnose, repair, overhaul and maintain automatic transmissions, operating principles, hydraulics, power flow, testing and overhaul procedures for transmissions and transaxles. On-vehicle inspection, diagnosis and repair are performed by the student.

PREREQUISITES: AUT 114, AUT 115, AUT 116, AUT 117, AUT 126, AUT 209

EXPECTED COMPETENCIES:
Upon completion of this course, the student will be familiar with:
Industry Information

- **Identify various career types in the automotive field**
  Objective

  - Identify the eight Automotive Service Excellence (ASE) service areas for technicians and the components included in each.
  - Identify career opportunities directly related to the automotive technology field.
  - Identify various methods used to pay automotive technicians.
  - Identify the difference between a union and a non-union shop.

Shop Safety

For every task in Automatic Transmissions and Transaxles, 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.
  - 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.

- **Identify and explain the safe and proper use of basic hand tools**
  Objective

  - Identify the types and uses of common end wrenches.
  - Identify the types and uses of socket set components.
  - Identify the types and uses of wrenches.
  - Identify the types and uses of screwdrivers.
  - Identify the types and uses of pliers.
  - Identify the types and uses of hammers.
  - Identify the types and uses of punches and chisels.

- **Identify and explain the safe and proper use of specialty tools, fasteners, and measuring tools**
  - Identify the types and uses of specialty tools.
  - Describe the procedures for cutting threads onto a rod or into a hole, repairing damaged threads, and removing broken bolts.
  - Identify common nuts and bolts in the English system.
  - Identify common nuts and bolts in the metric system.
  - Identify other types of common fasteners.
  - Identify the types and uses of measuring tools.
  - Identify the procedures for the care and use of measuring tools.

Wayne County Community College District

COURSE SYLLABUS

AUT 122 Automatic Transmission & Transaxle I

- **Identify and explain the safe and proper use of power tools and shop equipment**
  - Identify the types and uses of pneumatic, hydraulic, and electric power tools.
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  - Identify the hazards of power tools.
  - Identify the types, purposes, and safety considerations of common shop equipment.
  - Demonstrate the ability to:
    A. Lift a vehicle

General Transmission and Transaxle 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 transmission problems
  - Identify important diagnostic information included in driver complaints
  - Identify the procedures for road testing automatic transmissions
  - Identify the procedures for diagnosing transmission/transaxle noise and vibration problems
  - Identify the procedures for diagnosing and repairing fluid leakage and poor fluid condition
  - Demonstrate the ability to:
    a. Road test an automatic transmission

    b. Diagnose noise and vibration problems

    c. Diagnose transmission fluid leakage and poor fluid condition

- **Identify and interpret transmission/transaxle concern; differentiate between engine performance and transmission/transaxle concerns; determine necessary action. P-1**
  Objective
  - Identify terms and definitions associated with the evaluation and diagnosis of transmission problems
  - Identify important diagnostic information included in driver complaints
  - Identify the procedures for road testing automatic transmissions
  - Identify the procedures for diagnosing transmission/transaxle noise and vibration problems
  - Identify the procedures for diagnosing and repairing fluid leakage and poor fluid condition
  - Demonstrate the ability to:
    a. Road test an automatic transmission

    b. Diagnose noise and vibration problems

    c. Diagnose transmission fluid leakage and poor fluid condition

Wayne County Community College District

COURSE SYLLABUS

AUT 122 Automatic Transmission & Transaxle I

- **Research applicable vehicle and service information, such as transmission/transaxle system operation, fluid type, vehicle service history, service precautions, and technical service bulletins. P-1**
  Objective

  - Identify terms and definitions associated with basic principles of automotive transmission/transaxle systems.
  - Identify the basic principles by which an automotive transmission/transaxle system functions.

- **Locate and interpret vehicle and major component identification numbers. P-1**
  Objective

  - Identify terms and definitions associated with basic principles of automotive braking.
  - Identify the basic principles by which an automotive braking system functions.

- **Diagnose fluid loss and condition concerns; check fluid level in transmissions with and without dip-stick; determine necessary action. P-1**
  Objective

  - Identify terms and definitions associated with the evaluation and diagnosis of transmission problems
  - Identify important diagnostic information included in driver complaints
  - Identify the procedures for road testing automatic transmissions
  - Identify the procedures for diagnosing transmission/transaxle noise and vibration problems
  - Identify the procedures for diagnosing and repairing fluid leakage and poor fluid condition
  - Demonstrate the ability to:
    a. Road test an automatic transmission

    b. Diagnose noise and vibration problems

    c. Diagnose transmission fluid leakage and poor fluid condition

- **Perform pressure tests (including transmission/transaxles equipped with electronic pressure control); determine necessary action. P-1**
  Objective

  - Identify the various tests to be performed on automatic transmissions after they have been road tested
  - Identify the theory for performing a torque converter stall test
  - Identify the purpose and the basic principles of hydraulic control pressure tests
  - Identify the procedures for performing a hydraulic control pressure test
  - Identify the procedures for performing a torque converter stall test
  - Identify the procedures for testing lockup converters

- Demonstrate the ability to:
  a. Perform an automatic transmission stall test

  b. Perform a hydraulic control pressure test

  c. Perform a lockup torque converter test

- Identify the basic principles of testing components of an electronically controlled transmission/transaxle with a special scan tool.
- Identify the basic features found on many scan tools.
- Identify the procedures for basic scan tool operation.
- Demonstrate the ability to:
  a. Perform a visual/mechanical inspection of electronically controlled transmission/transaxle components.

  b. Access and interpret diagnostic codes.

  c. Perform pressure tests on electronically controlled transmissions/transaxles.

  d. Perform basic electrical diagnosis on electronically controlled

  transmission/transaxles.

- **Perform stall test; determine necessary action. P-3**
  Objective

  - Identify the various tests to be performed on automatic transmissions after they have been road tested
  - Identify the theory for performing a torque converter stall test
  - Identify the purpose and the basic principles of hydraulic control pressure tests
  - Identify the procedures for performing a hydraulic control pressure test
  - Identify the procedures for performing a torque converter stall test
  - Identify the procedures for testing lockup converters
  - Demonstrate the ability to:
    a. Perform an automatic transmission stall test

    b. Perform a hydraulic control pressure test

    c. Perform a lockup torque converter test

- **Perform lock-up converter system tests; determine necessary action. P-3**
  Objective

  - Identify the various tests to be performed on automatic transmissions after they have been road tested
  - Identify the theory for performing a torque converter stall test
  - Identify the purpose and the basic principles of hydraulic control pressure tests
  - Identify the procedures for performing a hydraulic control pressure test

- Identify the procedures for performing a torque converter stall test
- Identify the procedures for testing lockup converters
- Demonstrate the ability to:
  a. Perform an automatic transmission stall test

  b. Perform a hydraulic control pressure test

  c. Perform a lockup torque converter test

- **Diagnose noise and vibration concerns; determine necessary action. P-2**
  Objective

  - Identify terms and definitions associated with the evaluation and diagnosis of transmission problems
  - Identify important diagnostic information included in driver complaints
  - Identify the procedures for road testing automatic transmissions
  - Identify the procedures for diagnosing transmission/transaxle noise and vibration problems
  - Identify the procedures for diagnosing and repairing fluid leakage and poor fluid condition
  - Demonstrate the ability to:
    a. Road test an automatic transmission

    b. Diagnose noise and vibration problems

    c. Diagnose transmission fluid leakage and poor fluid condition

- **Diagnose transmission/transaxle gear reduction/multiplication concerns using driving, driven, and held member (power flow) principles. P-1**
  Objective

  - Identify terms and definitions associated with automatic transmission/transaxle drive train and major internal components.
  - Identify the operation of automatic transmission/transaxle drive train and name major components.
  - Identify the major internal components of an automatic transmission.
  - Identify torque converter components.
  - Identify the operation of a torque converter.
  - Identify the operation of planetary gear sets.
  - Identify the operation of clutch packs.
  - Identify band/servo operation.
  - Identify the operation of one-way clutches/sprags.
  - Identify the basics of transmission cooling systems.
  - Identify terms and definitions associated with automatic transmission hydraulic control systems.
  - Identify the operating principles of a simple hydraulic system.
  - Identify the basic components of a hydraulic system.
  - Describe the basic operation of a hydraulic system.

- Identify the basic types of hydraulic pumps used in automatic transmissions and the principles by which the pumps operate.
- Identify the basic types of hydraulic valves used in automatic transmissions and the principles by which the valves operate.
- Identify the components that control fluid pressure within an automatic transmission.
- Identify the operating principles of the shift control system within an automatic transmission.
- Identify the operating principles of a transmission fluid control unit.
- Identify the characteristics of automatic transmission fluid.
- Identify the various types of seals used in an automatic transmission.
- Identify the procedures for seal inspection and installation.

- **Diagnose pressure concerns in the transmission using hydraulic principles (Pascal's Law). P-2**
  Objective

  - Identify terms and definitions associated with automatic transmission/transaxle drive train and major internal components.
  - Identify the operation of automatic transmission/transaxle drive train and name major components.
  - Identify the major internal components of an automatic transmission.
  - Identify torque converter components.
  - Identify the operation of a torque converter.
  - Identify the operation of planetary gear sets.
  - Identify the operation of clutch packs.
  - Identify band/servo operation.
  - Identify the operation of one-way clutches/sprags.
  - Identify the basics of transmission cooling systems.
  - Identify terms and definitions associated with automatic transmission hydraulic control systems.
  - Identify the operating principles of a simple hydraulic system.
  - Identify the basic components of a hydraulic system.
  - Describe the basic operation of a hydraulic system.
  - Identify the basic types of hydraulic pumps used in automatic transmissions and the principles by which the pumps operate.
  - Identify the basic types of hydraulic valves used in automatic transmissions and the principles by which the valves operate.
  - Identify the components that control fluid pressure within an automatic transmission.
  - Identify the operating principles of the shift control system within an automatic transmission.
  - Identify the operating principles of a transmission fluid control unit.
  - Identify the characteristics of automatic transmission fluid.
  - Identify the various types of seals used in an automatic transmission.
  - Identify the procedures for seal inspection and installation.

Wayne County Community College District

COURSE SYLLABUS

AUT 122 Automatic Transmission & Transaxle I

- **Diagnose electronic transmission/transaxle control systems using appropriate test equipment and service information. P-1**
  Objective

    - Identify terms and definitions associated with automatic transmission/transaxle drive train and major internal components.
    - Identify the operation of automatic transmission/transaxle drive train and name major components.
    - Identify the major internal components of an automatic transmission.
    - Identify torque converter components.
    - Identify the operation of a torque converter.
    - Identify the operation of planetary gear sets.
    - Identify the operation of clutch packs.
    - Identify band/servo operation.
    - Identify the operation of one-way clutches/sprags.
    - Identify the basics of transmission cooling systems.
    - Identify terms and definitions associated with automatic transmission hydraulic control systems.
    - Identify the operating principles of a simple hydraulic system.
    - Identify the basic components of a hydraulic system.
    - Describe the basic operation of a hydraulic system.
    - Identify the basic types of hydraulic pumps used in automatic transmissions and the principles by which the pumps operate.
    - Identify the basic types of hydraulic valves used in automatic transmissions and the principles by which the valves operate.
    - Identify the components that control fluid pressure within an automatic transmission.
    - Identify the operating principles of the shift control system within an automatic transmission.
    - Identify the operating principles of a transmission fluid control unit.
    - Identify the characteristics of automatic transmission fluid.
    - Identify the various types of seals used in an automatic transmission.
    - Identify the procedures for seal inspection and installation.

In-Vehicle Transmission/Transaxle Maintenance and Repair

- **Inspect, adjust, and replace manual valve shift linkage, transmission range sensor/switch, and park/neutral position switch. P-2**
  Objective

    - Identify terms and definitions associated with the maintenance and adjustment of automatic transmissions
    - Identify the procedures for changing fluid and filter in an automatic transmission
    - Identify the procedures for adjusting the manual and throttle valve linkage or the cable in an automatic transmission
    - Identify the operating principles of and the maintenance procedures for bands within automatic transmissions
    - Identify the operating principles of and the maintenance procedures for automatic transmission sensors

Demonstrate the ability to:

a. Service fluid and filter in an automatic transmission

b. Adjust the manual and throttle valve in an automatic transmission

c. Adjust the bands in an automatic transmission

d. Test and service ground switches, line switches, speed sensors, and Hall

Effect switches in automatic transmissions or transaxles

- **Inspect and replace external seals, gaskets, and bushings. P-2**
  Objective
  - Identify terms and definitions associated with in-vehicle transmission inspection and repair
  - Identify the procedures for making in-vehicle inspections, adjustments, and repairs
  - Demonstrate the ability to:
    a. Test and adjust the vacuum modulator

    b. Inspect and test the governor and governor cover

    c. Remove and replace external seals and gaskets

    d. Replace the extension housing and bushing

    e. Inspect the speedometer drive assembly

    f. Clean, inspect, and repair valve body components

    g. Inspect and repair servos and accumulators

- **Inspect, replace, and align power-train mounts. P-2**
  Objective
  - Identify the procedures for inspecting and repairing components related to the transmission
  - Demonstrate the ability to:
    a. Test and flush transmission coolers

    b. Repair transmission cooler lines

    c. Test transmission solenoids and relays

    d. Inspect transmission mounts
- **Service transmission; perform visual inspection; replace fluid and filters. P-1**
  Objective

Wayne County Community College District

COURSE SYLLABUS

AUT 122 Automatic Transmission & Transaxle I

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