



Wayne County Community College District

COURSE SYLLABUS

AUT 203 Brakes II

CREDIT HOURS: 3.00

CONTACT HOURS: 60.00

COURSE DESCRIPTION:

This course is a continuation of Brakes I and will be used to exercise the student's abilities to perform theory, diagnosis and operations of automotive braking systems. The student will inspect, remove & replace braking system components, perform machining techniques, overhaul and repair braking systems. This automotive brakes class is a combination of (70%) laboratory experiences and (30%) lecture. Every student will be expected to participate in lab exercises and will be evaluated on an individual basis. The ASE certification requirements will be highly stressed in this course.

PRE-REQUISITE: AUT 114, AUT 115, AUT 116, AUT 117, and AUT 120

EXPECTED COMPETENCIES

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

Shop Safety

For every task in Brakes, 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.

Hydraulic System Diagnosis and Repair

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

Objective

- Identify the procedures for identifying the customer's concern.
- Identify terms and definitions associated with basic principles of automotive braking.
- Identify the basic principles by which an automotive braking system functions.
- Identify terms and definitions associated with basic principles of automotive braking.
- Identify the basic principles by which an automotive braking system functions.

- **Inspect, test, and/or replace metering (hold-off), proportioning (balance), pressure differential, and combination valves. P-3**

Objective

- Identify terms and definitions associated with brake system switches and valves in the brake hydraulic system.
- Identify the procedures for inspecting and testing hydraulic brake switches and brake valves.
- Demonstrate the ability to:
 - A. Diagnose, adjust, and repair brake valves

- **Measure brake pedal height, travel, and free play (as applicable); determine necessary action. P-1**

Objective

- Identify the procedures for inspecting and adjusting brake pedal free height and travel.

- **Check master cylinder for internal/external leaks and proper operation; determine necessary action. P-1**

Objective

- Identify the procedure for inspecting the master cylinder.
- Identify terms and definitions associated with the master cylinder and brake hydraulic components.
- Identify the procedures for removing, bench bleeding, and replacing the master cylinder.



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- **Bleed and/or flush brake system. P-1**

Objective

- Identify terms and definitions associated with bleeding brake systems.
- Identify the procedures for bleeding the brake system.
- Demonstrate the ability to:
 - A. Bleed the brake system

- **Test brake fluid for contamination. P-1**

Objective

- Identify terms and definitions associated with brake system switches and valves in the brake hydraulic system.
- Identify the procedures for inspecting and testing hydraulic brake switches and brake valves.

- **Inspect, test, and/or replace components of brake warning light system. P-3**

Objective

- Test the brake warning light system
- Test brake lights

Drum Brake Diagnosis and Repair

- **Inspect and install wheel cylinders. P-2**

Objective

- Identify terms and definitions associated with drum brake inspection.
- Identify the procedures for disassembling, inspecting, and servicing drum brakes.
- Identify the procedures for disassembling and inspecting the wheel cylinder.
- Identify the procedures for installing and adjusting drum brake components

- **Install wheel, torque lug nuts, and make final checks and adjustments. P-1**

Objective

- Demonstrate the ability to:
 - A. Disassemble and inspect drum brakes
 - B. Service wheel cylinders
 - C. Machine brake drums
 - D. Reinstall drum brake assemblies

- **Check brake pad wear indicator system operation; determine necessary action. P-2**

Objective

Disc Brake Diagnosis and Repair

- **Retract caliper piston on an integrated parking brake system. P-3**

Objective

- Identify procedures for inspecting and repairing calipers.
- Identify procedures for installing and adjusting disc brake calipers.

Power Assist Units Diagnosis and Repair

- **Inspect and test hydraulically assisted power brake system for leaks and proper operation; determine necessary action. P-3**



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Objective

- Identify vacuum- and hydro-boost power brake systems.
- Identify the operating principles of vacuum- and hydro-boost power brake systems.
- Identify the procedures for repairing power boosters.
- Demonstrate the ability to:
 - A. Remove and replace a vacuum power booster
 - B. Test the hydro-boost system

- **Measure and adjust master cylinder pushrod length. P-3**

Objective

- Identify terms and definitions associated with power-assisted brake systems.
- Identify vacuum- and hydro-boost power brake systems.
- Identify the operating principles of vacuum- and hydro-boost power brake systems.
- Identify the procedures for repairing power boosters.
- Demonstrate the ability to:
 - A. Remove and replace a vacuum power booster

- **Test pedal free travel; check power assist operation. P-2**

Objective

- Identify the procedure for diagnosing power-assist brake systems.
- Identify terms and definitions associated with power-assisted brake systems.
- Identify vacuum- and hydro-boost power brake systems.
- Identify the operating principles of vacuum- and hydro-boost power brake systems.
- Identify the procedures for repairing power boosters.
- Demonstrate the ability to:
 - A. Remove and replace a vacuum power booster
 - B. Test the hydro-boost system

- **Check vacuum supply to vacuum-type power booster. P-1**

Objective

- Identify terms and definitions associated with power-assisted brake systems.
- Identify vacuum- and hydro-boost power brake systems.
- Identify the operating principles of vacuum- and hydro-boost power brake systems.
- Identify the procedures for repairing power boosters.
- Demonstrate the ability to:
 - A. Remove and replace a vacuum power booster
 - B. Test the hydro-boost system

Electronic Brake, Traction and Stability Control Systems

- **Identify and inspect electronic brake control system components; determine necessary action. P-1**

Objective

- Identify terms and definitions associated with anti-lock brake systems.
- Identify how anti-lock brake systems are used on vehicles.
- Identify anti-lock brake components.
- Identify variations in the anti-lock brake system design.
- Identify how some vehicle manufacturers tailor anti-lock brake systems to meet their specific needs.
- Complete the assignment sheet on anti-lock brake components



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- Identify terms and definitions associated with anti-lock brake systems.
- Identify characteristics unique to anti-lock brake systems.
- Identify precautions to observe when servicing anti-lock brake systems.
- Identify types of anti-lock brake functions.
- Identify procedures for diagnosing anti-lock brake systems.
- Identify procedures for diagnosing intermittent anti-lock brake problems.
- Demonstrate the ability to:
 - A. Diagnose anti-lock brake system concerns caused by vehicle modifications
 - B. Inspect anti-lock brake system
 - C. Service anti-lock brake system components
 - D. Performance test anti-lock brake system

- **Diagnose poor stopping, wheel lock-up, abnormal pedal feel, unwanted application, and noise concerns associated with the electronic brake control system; determine necessary action. P-2**
Objective
 - Identify anti-lock brake components.

- **Diagnose electronic brake control system electronic control(s) and components by retrieving diagnostic trouble codes and/or using recommended test equipment; determine necessary action. P-1**
Objective
 - Identify procedures for diagnosing anti-lock brake systems.
 - Identify procedures for diagnosing intermittent anti-lock brake problems.
 - Identify procedures for servicing individual anti-lock brake components.
 - Demonstrate the ability to:
 - A. Diagnose the anti-lock brake system
 - B. Diagnose anti-lock brake electronic controls
 - C. Repair or replace the anti-lock brake system.
 - D. Depressurize the anti-lock brake system.
 - E. Bleed the anti-lock brake hydraulic system.
 - F. Diagnose the Anti-Lock Brake System Speed Sensors Using GMM/DSO Equipment.

- **Depressurize high-pressure components of the electronic brake control system. P-3**
Objective
 - Identify terms and definitions associated with anti-lock brake systems.
 - Identify how anti-lock brake systems are used on vehicles.
 - Identify anti-lock brake components.
 - Identify variations in the anti-lock brake system design.
 - Identify how some vehicle manufacturers tailor anti-lock brake systems to meet their specific needs.
 - Complete the assignment sheet on anti-lock brake components.



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- Demonstrate the ability to:
 - A. Diagnose anti-lock brake system concerns caused by vehicle modifications.
 - B. Inspect anti-lock brake system.
 - C. Service anti-lock brake system components.
 - D. Performance test anti-lock brake system
 - E. Diagnose the anti-lock brake system.
 - F. Diagnose anti-lock brake electronic controls.
 - G. Repair or replace the anti-lock brake system.
 - H. Depressurize the anti-lock brake system.
 - I. Bleed the anti-lock brake hydraulic system.
 - J. Diagnose the Anti-Lock Brake System Speed Sensors Using GMM/DSO Equipment

- **Bleed the electronic brake control system's hydraulic circuits. P-1**
Objective
 - Identify procedures for diagnosing intermittent anti-lock brake problems.
 - Identify procedures for servicing individual anti-lock brake components.

- **Remove and install electronic brake control system electrical/electronic and hydraulic components. P-3**
Objective
 - Identify terms and definitions associated with anti-lock brake systems.
 - Identify how anti-lock brake systems are used on vehicles.
 - Identify anti-lock brake components.
 - Identify variations in the anti-lock brake system design.
 - Identify how some vehicle manufacturers tailor anti-lock brake systems to meet their specific needs.

- **Test, diagnose and service electronic brake control system. speed sensors (digital and analog), toothed ring (tone wheel), and circuits using a graphing multimeter (GMM)/digital storage oscilloscope (DSO) (includes output signal, resistance, shorts to voltage/ground, and frequency data). P-1**
Objective
 - Identify terms and definitions associated with anti-lock brake systems.
 - Identify how anti-lock brake systems are used on vehicles.
 - Identify anti-lock brake components.
 - Identify variations in the anti-lock brake system design.
 - Identify how some vehicle manufacturers tailor anti-lock brake systems to meet their specific needs.

- **Diagnose electronic brake control system braking concerns caused by vehicle modifications (tire size, curb height, final drive ratio, etc.). P-3**
Objective
 - Identify terms and definitions associated with anti-lock brake systems.
 - Identify how anti-lock brake systems are used on vehicles.
 - Identify anti-lock brake components.
 - Identify variations in the anti-lock brake system design.
 - Identify how some vehicle manufacturers tailor anti-lock brake systems to meet their specific needs.



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- **Identify traction control/vehicle stability control system components. P-3**

Objective

- Identify terms and definitions associated with anti-lock brake systems.
- Identify how anti-lock brake systems are used on vehicles.
- Identify anti-lock brake components.
- Identify variations in the anti-lock brake system design.
- Identify how some vehicle manufacturers tailor anti-lock brake systems to meet their specific needs.

- **Describe the operation of a regenerative braking system. P-3**

Objective

Miscellaneous (Wheel Bearings, Parking Brakes, Electrical, Etc.) Diagnosis and Repair

- **Inspect and replace wheel studs. P-1**

Objective

- Identify terms and definitions associated with wheel bearing service.
- Identify the principles of wheel bearing service and adjustment.
- Identify the procedures for inspecting and servicing non-sealed wheel bearings.
- Identify the procedure for adjusting non-sealed wheel bearings.
- Identify the procedures for inspecting and servicing sealed wheel bearings.
- Demonstrate the ability to:
 - A. Diagnose wheel bearing noise, wheel shimmy, and vibrations
 - B. Inspect, replace, and adjust serviceable wheel bearings
 - C. Inspect and replace nonadjustable or non-serviceable wheel bearings
 - D. Inspect and replace wheel studs.

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