South Central College

AST 1613  Brakes

Course Outcome Summary

Course Information

<table>
<thead>
<tr>
<th>Description</th>
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<td>This course will cover the principles of friction and braking systems, disc and drum brakes, parking brakes, and power assist units. Emphasis will be placed on system operation, diagnosis, repair, and maintenance of various types of braking systems. (Prerequisite: Admission into the Automotive Service program and AST1112 or instructor approval)</td>
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<tr>
<td>Total Credits</td>
<td>3</td>
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<td>Total Hours</td>
<td>72</td>
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Types of Instruction

<table>
<thead>
<tr>
<th>Instruction Type</th>
<th>Credits/Hours</th>
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<tr>
<td>Lecture</td>
<td>1.5/24</td>
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<tr>
<td>Lab</td>
<td>1.5/48</td>
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Pre/Corequisites

Admission into the Automotive Service program

Institutional Core Competencies

Critical and Creative Thinking - Students will be able to demonstrate purposeful thinking with the goal of using a creative process for developing and building upon ideas and/or the goal of using a critical process for the analyzing and evaluating of ideas.

Course Competencies

1. **Exhibit professionalism**
   - Learning Objectives
   - Identify brake related health hazards
   - Exhibit proper safety procedures

2. **Identify brake system operation**
   - Learning Objectives
   - Identify and interpret brake system concern; determine necessary action
   - Remove, clean, and inspect wheel bearings, repack, replace seals, install hub and adjust bearings
   - Describe procedure for performing a road test to check brake system operation including an anti-lock brake system (ABS)
Diagnose wheel bearing noises, wheel shimmy, and vibration concerns; determine necessary action
Diagnose poor stopping, pulling or dragging concerns caused by malfunctions in the hydraulic system; determine necessary action
Diagnose poor stopping, noise, vibration, pulling, grabbing, dragging or pedal pulsation concerns; determine necessary action
Install wheel, torque lug nuts, and make final checks and adjustments

3. **Diagnose hydraulic system operation using Pascal's Law**

   **Learning Objectives**
   - Inspect, test, and/or replace and adjust height of load sensing proportioning valve
   - Inspect and test or replace metering, proportioning, pressure differential, and combination valves
   - Install wheel, torque lug nuts, and make final checks and adjustments

4. **Identify drum brake components and their functions**

   **Learning Objectives**
   - Remove, clean, inspect, and/or replace brake shoes, springs, pins, clips, levers, adjusters/self-adjusters, other related brake hardware, and backing support plates
   - Remove, inspect, clean and measure brake drum; determine necessary action
   - Machine a brake drum; measure final drum diameter
   - Remove, inspect, rebuild or install new wheel cylinder
   - Reinstall and lubricate or replace brake shoes, hardware, and adjusters
   - Pre-adjust brake shoes and parking brake; before installing brake drums or drum/hub assemblies and wheel bearings
   - Diagnose drum brake noise and performance problems
   - Install wheel, torque lug nuts, and make final checks and adjustments

5. **Inspect brake lines, flexible hoses, and fittings for leaks, dents, kinks, rust, cracks, bulging or wear; tighten loose fittings and supports; determine necessary action**

   **Learning Objectives**
   - Replace a brake bleeder screw
   - Fabricate brake lines using proper material and flaring procedures (double flare and ISO); replace hoses, fittings, and supports
   - Install wheel, torque lug nuts, and make final checks and adjustments

6. **Identify disc brake components and their functions**

   **Learning Objectives**
   - Remove and clean caliper assembly; inspect for leaks, damage, and wear; determine needed action
   - Clean and inspect caliper mounting and slides/pins for operation, wear, and damage; determine necessary action
   - Remove, inspect disc brake pads, retaining hardware and pad wear indicator system operation; determine necessary action
   - Remove, clean, inspect mounting surface; measure rotor thickness, lateral runout, and thickness variation; determine necessary action
   - Refinish a disc brake rotor off vehicle; measure final rotor thickness and install
   - Disassemble and clean caliper, inspect parts for wear, rust, scoring, damage, replace seals and worn parts
   - Reassemble, lubricate, and install caliper, pads, and related hardware; seat pads, inspect for leaks
   - Retract caliper piston and re-adjust with integrated parking brake system
   - Diagnose disc brake noise and performance problems
   - Install wheel, torque lug nuts, and make final checks and adjustments

7. **Check a master cylinder for internal / external leaks and proper operation**

   **Learning Objectives**
   - Remove, bench bleed, and replace a master cylinder
   - Select, handle, store, and fill brake fluids to proper level; use proper fluid type per manufacturer specification
   - Fill master cylinder with recommended fluid, burnish disc pads, and check system for leaks
   - Install wheel, torque lug nuts, and make final checks and adjustments

8. **Bleed brake system with pressure, vacuum, or surge**

   **Learning Objectives**
   - Explain diagonally split brake system operation
Manually bleed or flush a brake system, test brake fluid for contamination. Install wheel, torque lug nuts, and make final checks and adjustments.

9. **Explain vacuum and hydraulic assist unit operation**
   
   **Learning Objectives**
   
   Measure and adjust brake pedal height, travel, free play (as applicable), and master cylinder pushrod length; determine necessary action. Test brake pedal free travel with and without engine running to verify proper power booster operation. Identify components of the brake power assist system (vacuum and hydraulic); check vacuum supply (manifold or auxiliary pump) to vacuum-type power booster. Inspect the vacuum-type power booster unit for vacuum leaks; inspect the check valve for proper operation; determine necessary action. Diagnose power brake vacuum assist operation. Inspect and test hydraulically assisted power brake system for leaks and proper operation. Install wheel, torque lug nuts, and make final checks and adjustments.

10. **Check parking brake operation and adjust as needed**
    
    **Learning Objectives**
    
    Check parking brake system and components for wear, binding, and corrosion; clean, lubricate, adjust, and/or replace as needed. Describe automatic parking brake release system operation.

11. **Identify, inspect, and test or replace components of park brake and brake light warning system**
    
    **Learning Objectives**
    
    Check operation of stop light system; determine necessary action. Identify components that turn on the red brake warning light. Diagnose red brake warning light system.

**SCC Accessibility Statement**

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Additional information and forms can be found at: [www.southcentral.edu/disability](http://www.southcentral.edu/disability)

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