

# AUTOMOTIVE BRAKES

## Pierce County Careers Connection

### Dual Credit Articulation Agreement

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#### Upon completion of high school courses equivalent to the following competencies:

- Must complete 100% of the following:**
- Diagnose poor stopping, pulling, or dragging caused by problems in the hydraulic system; determine needed repairs.
  - Inspect flexible brake hoses for leaks, kinks, crack, bulging, or wear; tighten loose fittings and supports.
  - Select, handle, store, and install brake fluids (including silicone fluids).
  - Bleed (manual, pressure, vacuum, or surge) and/or flush hydraulic system.
  - Diagnose poor stopping, noise, pulling, grabbing, or pedal pulsation caused by problems in the drum brake mechanical assembly; determine needed repairs.
  - Remove, clean, inspect, and measure brake drums; service or replace as needed.
  - Mount brake drum on lathe; machine braking surface.
  - Remove, clean, and inspect brake shoes, springs, pins, clips, levers, adjusters/self-adjusters, and other related brake hardware; and backing support plates; lubricate and reassemble.
  - Remove and reinstall wheel cylinder.
  - Pre-adjust brake shoes and parking brake before installing brake drums or drum/hub assemblies and wheel bearings.
  - Reinstall wheel, torque lug nuts, and make final checks and adjustments.
  - Diagnose poor stopping, noise, pulling, grabbing, dragging or pedal pulsation caused problems; determine needed repairs.
  - Remove caliper assembly from mountings; clean and inspect for leaks and damage to caliper housing.
  - Clean and inspect caliper mountings and slides for wear and damage.
  - Remove, clean, and inspect pads and retaining hardware; determine needed repairs.
  - Reassemble, lubricate and reinstall caliper, pads, and related hardware.
  - Clean, inspect, and measure rotor with a dial indicator and a micrometer; follow manufacturer's recommendations in determine need to machine or replace.
  - Refinish rotor according to manufacturer's recommendations.
  - Fill master cylinder with recommended fluid and seat pads; inspect caliper for leaks.
  - Reinstall, wheel, torque lug nuts, and make final checks and adjustments.
  - Remove and replace rotor.
  - Diagnose wheel bearing noises, wheel shimmy, and vibration problems; determine needed repairs.
  - Remove, clean, inspect, repack, and reinstall wheel bearings and replace seals; reinstall hub and adjust wheel bearings.
  - Check parking brake operation; adjust as needed.
  - Check operation of brake light system; adjust and service as needed.
  - Replace wheel bearing and race.
  - Observe anti-lock brake system (ABS) warning light(s) at startup; determine if further diagnosis is needed.
  - Depressurize high-pressure components of the anti-lock brake system (ABS) following the manufacturer's recommended safety procedures.
  - Fill the anti-lock brake system (ABS) master cylinder with the recommended fluid following manufacturer's procedures; inspect system for leaks.
  - Remove, bench bleed, and replace master cylinder.
  - Inspect brake lines and fitting for leaks, dents, kinks, rust, cracks, or wear; tighten loose fittings and supports.
  - Fabricate and install brake lines (double flare and ISO types); replace hoses, fittings and supports as needed.
  - Inspect, test, and replace metering (hold off), proportioning (balance), pressure differential, and combination valves.
  - Inspect, test, and replace brake warning light system switch and wiring.
  - Disassemble, and clean caliper assembly; inspect parts for wear, rust, scoring, and damage; replace seal, boot and damaged worn parts.
  - Test pedal free travel with and without engine running to check power assist operation.
  - Check vacuum supply (manifold or auxiliary pump) to vacuum-type power booster with a vacuum gauge.
  - Inspect the vacuum-type power booster unit for vacuum leaks; inspect the check valve for proper operation; repair or replace parts as necessary.
  - Check parking brake cables and components for wear, rusting, binding, and corrosion; clean lubricate, and replace as needed.
  - Check operation of parking brake indicator light system.
  - Diagnose anti-lock brake system (ABS) electronic control(s) and components using self-diagnosis and/or recommended test equipment; determine needed repairs.
  - Bleed the anti-lock brake system's (ABS) front and rear hydraulic circuits following manufacturer's procedures.
  - Service, test, and adjust anti-lock system (ABS) speed sensors following manufacturer's recommended procedures.
  - Measure and adjust pedal pushrod length.
  - Check master cylinder for internal and external leaks and proper operation; determine needed repairs.
  - Inspect, test, replace, and adjust load or height sensing type proportioning valve(s).
  - Adjust calipers with integrated parking brakes.
  - Inspect, test, and service anti-lock brake system (ABS) hydraulic, electrical, and mechanical components.
  - Diagnose poor stopping, wheel lock-up, abnormal pedal feel or pulsation, and noise problems caused by the anti-lock system (ABS); determine needed repairs.

- Perform a fluid pressure (hydraulic boost) diagnosis on the integral (high pressure) anti-lock system (ABS); determine needed repairs.
- Remove and install anti-lock brake system (ABS) electrical/electronic/hydraulic components following manufacturer's procedures and specification.
- Diagnose anti-lock brake system (ABS) braking problems caused by vehicle modifications (tire size, curb height, final drive ratio, etc.).

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**A student earning a "C" grade or better may earn college credit at the following college:**

| <u>College</u>                | <u>Course</u>               | <u>Credits</u> |
|-------------------------------|-----------------------------|----------------|
| Bates Technical College       | AUTOM 141                   | 4              |
| Clover Park Technical College | AUT 147 (CIP Code: 47.0604) | 6              |