

# Minnesota Articulated College Credit (ACC) Agreement

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**Agreement Name**                      **Automotive Brakes**

**Agreement Last Reviewed**    **Fall 2024**

**Next Review Date**                      **Fall 2026**

| College Courses |                             |  |            |
|-----------------|-----------------------------|--|------------|
| Class           | Title                       | School                                       | Credits    |
| AUTO 1131       | Brakes                      | Minnesota West Community & Technical College | 1.0 of 3.0 |
| AUTO 1152       | Brakes I                    | Ridgewater College                           | 1.0 of 2.0 |
| AND             |                             |  |            |
| AUTO 2352       | Brakes 2                    | Ridgewater College                           | 1.0 of 2.0 |
| AST 1613        | Brakes                      | South Central College                        | 1.0 of 3.0 |
| ABCT 1840       | Auto Collision Mechanical I | South Central College                        | 1.0 of 3.0 |
| AMT 1730        | Brakes Theory               | Rochester Community & Technical College      | 1.0 of 2.0 |

## Curriculum Content Objectives

To receive credit, students will perform each of the following content objectives:

### Hydraulic System Diagnosis and Repair

1. Demonstrate professional automotive technician behavior, acceptable attendance, and demonstrate shop safety.
2. Check the master cylinder for internal and external leaks and proper operation; determine necessary action.
3. Remove, bench bleed, and reinstall the master cylinder. *(Optional)*
4. Diagnose poor stopping, pulling, or dragging concerns caused by problems in the hydraulic system; determine necessary action.
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.
6. Select, handle, store, and install brake fluids to the proper level.
7. Bleed (manual, pressure, vacuum, or surge) brake system.
8. Identify and describe ISO (bubble flare) and 45/37 double flare.
9. Perform ISO or 45-degree double flare.

### Drum Brake Diagnosis and Repair

1. Diagnose poor stopping, noise, pulling, grabbing, dragging, or pedal pulsation concerns; determine necessary action.
2. Remove, clean (using proper safety procedures), inspect and measure brake drums; service or replace as needed.
3. Explain the purpose of machining a brake drum.

4. 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.
5. Pre-adjust brake shoes and parking brake before installing brake drums or drum/hub assemblies and wheel bearings.
6. Install wheel, and torque lug nuts, and make final checks and adjustments.

### **Disc Brake Diagnosis and Repair**

1. Diagnose poor stopping, noise, pulling, grabbing, dragging, or pedal pulsation concerns; determine necessary action.
2. Remove caliper assembly from mountings; clean and inspect for leaks and damage to caliper housing; determine necessary action.
3. Clean and inspect caliper mounting and slides for wear and damage; determine necessary action.
4. Remove, clean, and inspect pads and retaining hardware; determine necessary action.
5. Lubricate and reinstall caliper, pads, and related hardware; seat pads and inspect for leaks.
6. Clean, inspect, and measure the rotor with a dial indicator and micrometer; follow the manufacturer's recommendations in determining the need to machine or replace it.
7. Adjust calipers with integrated parking brake system. *(Optional)*
8. Install wheel, and torque lug nuts, and make final checks and adjustments.

### **Power Assist Units Diagnosis and Repair**

1. Test pedal-free travel with and without engine running; check power assist operation.
2. Check the vacuum supply (manifold or auxiliary pump) to vacuum-type power booster.
3. Inspect vacuum-type power booster unit for leaks; inspect check valve for proper operation; determine necessary action.

### **Miscellaneous (Wheel Bearings, Parking Brakes, Electrical, etc.) Diagnosis and Repair**

1. Diagnose wheel bearing noises, wheel shimmy, and vibration concerns; determine necessary action.
2. Explain tapered wheel bearing and race service.
3. Check parking brake cables and components for wear, rusting, binding, and corrosion; clean, lubricate and replace as needed.
4. Check parking brake operation; adjust as needed.
5. Check the operation of the parking brake indicator light system.
6. Check the operation of the brake stop light system; adjust and service as needed.

### **Anti-lock Brake System**

1. Exposure to anti-lock brake system (ABS/Stability Control) electronic control(s) and components using self-diagnosis and/or recommended test equipment; determine necessary action.

### **Assessments**

To receive ACC, students must achieve no less than 80% or B for a final grade in the high school course. For partially earned college credits, students must take the course at the college with a tuition discount.

### **ACC Concept**

Through Articulated College Credit (ACC), specific college curriculum content goals and assessments are embedded in participating high school career and technical education (CTE) programs as specified in this agreement. Relevant knowledge, skills, and standards are taught by qualified CTE high school instructor(s) in one or more high school courses. ACC is awarded if the student meets the college equivalency standards and later enrolls in the college(s) listed below requiring the course in a specific program.