

COURSE PREFIX /NO: **AUT 112**
COURSE TITLE: **BRAKING SYSTEMS**
LEC HRS/WEEK: **2.0**
LAB HRS/WEEK: **6.0**
CREDIT HRS/SEMESTER: **4.0**

[DL ATTENDANCE/VA STATEMENT](#)
[TEXTBOOK INFORMATION](#)

COURSE DESCRIPTION

This course covers hydro-boost power brakes and vacuum power brakes as well as master cylinders and caliper rebuilding.

COURSE COMPETENCIES

Upon successful completion of this course, the student should be competent to perform the following tasks:

Module 1. General Brake System Diagnosis

1. Identify and interpret brake system concerns; determine necessary action.
2. Research applicable vehicle and service information, such as brake system operation, vehicle service history, service precautions, and technical service bulletins.
3. Locate and interpret vehicle and major component identification numbers (VIN, vehicle certification labels, calibration decals).

Module 2. Hydraulic System Diagnosis and Repair

1. Measure and adjust pedal height.
2. Check master cylinder for internal and external leaks and proper operation; determine necessary action.
3. Remove, bench bleed, and reinstall master cylinder.
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. Fabricate and install brake lines (double flare an ISO types); replace hoses, fittings, and supports as needed.
7. Select, handle, store, and install brake fluids to proper level.
8. Inspect, test, and replace metering (hold-off), proportioning (balance), pressure differential, and combination valves.
9. Inspect, test, and adjust height (load) sensing proportioning valve.
10. Inspect, test, and replace components of brake warning light system.
11. Bleed (manual, pressure, vacuum or surge) brake system.
12. Flush hydraulic system.
13. Diagnosis pressure concerns in the brake system using hydraulic principals (Pascal's Law).

Module 3. 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. Mount brake drum on lathe; machine braking surface.
4. Remove, clean, and inspect brake shoes, springs, pins, clips, levers, adjusters/self-adjusters, other related brake hardware, and backing support plates; lubricate and reassemble.
5. Remove, inspect, and install wheel cylinders.
6. Pre-adjust brake shoes and parking brake before installing brake drums or drum/hub assemblies and wheel bearings.
7. Install wheel, torque lug nuts, and make final checks and adjustments.

Module 4. Disk 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. Disassemble and clean caliper assembly; inspect parts for wear, rust, scoring, and damage; replace seal, boot, and damaged or worn parts.
6. Reassemble, lubricate, and reinstall caliper, pads, and related hardware; seat pads, and inspect for leaks.
7. Clean, inspect, and measure rotor with a dial indicator and a micrometer; follow manufacturer's recommendations in determining need to machine or replace.
8. Refinish rotor according to manufacturer's recommendations.
9. Adjust calipers with integrated parking brake system.
10. Install wheel, torque lug nuts, and make final checks and adjustments.
11. Remove and replace rotor.

Module 5. Power Assist Units Diagnosis and Repair

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

Module 6. Miscellaneous (Wheel Bearings, Parking Brakes, Electrical, Etc.) Diagnosis and Repair

1. Diagnose wheel bearing noises, wheel shimmy, and vibration concerns; determine necessary action.
2. Remove, clean, inspect, repack, and install wheel bearings and replace seals; install hub and adjust wheel bearings.
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 operation of parking brake indicator light system.
6. Check operation of brake stop light system; adjust and service as needed.
7. Replace wheel bearing and race.
8. Inspect and replace wheel studs.
9. Remove and install sealed wheel bearing assembly.

Module 7. Anti-lock Brake System

1. Inspect and test anti-lock brake system (ABS) components; determine necessary action.
2. Diagnose poor stopping, wheel lock-up, abnormal pedal feel or pulsation, noise concerns caused by the anti-lock brake system (ABS); determine necessary action.
3. Diagnose anti-lock brake system (ABS) electronic control(s) and components using self-diagnosis and/or recommended test equipment; determine necessary action.
4. Depressurize high-pressure components of the anti-lock brake system (ABS).
5. Bleed the anti-lock brake system's (ABS) front and rear hydraulic circuits.
6. Remove and install anti-lock brake system (ABS) electrical/electronic and hydraulic components.

7. Test, diagnosis and service ABS speed sensors, toothed ring (tone wheel), and circuits using graphing multimeter (GMM)/digital storage oscilloscope (DSO) (includes output signal, resistance, shorts to voltage/ground, and frequency data).
8. Identify traction control system components.
9. Diagnose anti-lock brake system (ABS) braking concerns caused by vehicle modifications (tire size, curb height, final drive ratio, etc.)

COURSE REQUIREMENTS

Students are responsible for attaining competencies through completion of the following course requirements:

ATTENDANCE:

Students will be bound by the policies stated in the York Technical College Student Handbook. Students must attend 80% of the hours assigned the class for a semester to receive credit for the course. In case a student does miss a class, the student is responsible for obtaining the material that was covered during the absence. If a student is aware that a class will be missed, then the student should notify the instructor at the earliest possible date. Students with unexcused absences during tests will be allowed to make up tests at the discretion of the instructor. The student has the burden to be sure that some arrangement has been made with the instructor for taking a make-up test.

ACADEMIC HONESTY

York Technical College adheres to the South Carolina Tech Student code, approved by the State Board for Technical and Comprehensive Education on March 13, 1974(revised last April, 25 1984). Copies of this code are available in the Library and from Student Services. Any student involved in cheating or any other academic dishonesty will be given a grade of zero and will be subject to further disciplinary action. See the student handbook section “Student Life” subheading “Student Conduct” for further details.

PARTICIPATION IN CLASS

Students will be expected to participate in class discussions, to demonstrate problem-solving techniques, to complete tests, homework, lab experiments, lab reports and other assigned work.

EVALUATION STRATEGIES / GRADING

The grading scale will be as follows:

Grade Points	
A	90-100
B	80-89
C	70-79
D	60-69
F	00-59

Evaluation Method

Tests may be written or oral and may contain questions that are true or false, short answer, multiple choice, fill in the blank and/or problems. Students should refer to the instructor for the number of tests to be given and the material to be covered on each test. Each test will be of equal weight unless otherwise indicated by the instructor. Lab grades will be based on the completion of the Course Competencies, team work, safety, class participation, and housekeeping.

Final grades will be determined as follows:

Module 1.	Tests	5.5%
Module 1.	Lab	11.16%
Module 2.	Test	5.5%
Module 2.	Lab	11.16%
Module 3.	Test	5.5%
Module 3.	Lab	11.16%
Module 4.	Test	5.5%
Module 4.	Lab	11.16%
Module 5.	Test	5.5%
Module 5.	Lab	11.16%
Module 6.	Test	5.5%
Module 6.	Lab	<u>11.16%</u>
Total Grade		100%

ENTRY-LEVEL SKILLS

Students should demonstrate hand eye coordination, manual dexterity, and be able to work in an industrial environment.

PREREQUISITES - None

CO-REQUISITES - None