

**I. CATALOG DESCRIPTION:**

- A. Department Information:  
Division: Technical  
Department: Automotive  
Course ID: AUTO 050  
Course Title: Automotive Brakes  
Units: 4  
Lecture: 3 Hours  
Laboratory: 3 Hours  
Prerequisite: None
- B. Catalog Description:  
This course is based upon NATEF standards and designed for students and current technicians to gain knowledge and skills in automotive brakes (standard and anti-lock) systems. Included but not limited to disc, drum, hydraulics, power boosters, and traction control. Emphasis on diagnosing, trouble-shooting, repairing, replacing, and adjusting. This course may be used in preparation for the Automotive Service Excellence (ASE) National Test (A-5). Theory and practical work in the repair of brake system. Shop instruction to include safety, machinery, procedures for trouble shooting and reconditioning of brake systems.
- C. Schedule Description:  
Theory and practical work in the repair of brake system. Shop instruction to include safety, machinery, procedures for trouble shooting and reconditioning of brake systems. ASE National Test (A-5) applicable.

**II. NUMBER OF TIMES COURSE MAY BE TAKEN FOR CREDIT: One**

**III. EXPECTED OUTCOMES FOR STUDENTS:**

Upon completion of the course the student should be able to:

- A. Identify malfunctions of hydraulic systems.
- B. Evaluate the condition of drum brakes and summarize the necessary repairs.
- C. Diagnosis and repair disc brakes.
- D. Inspect and test power assist units.
- E. Demonstrate proper procedures for servicing parking brakes, and wheel bearings.
- F. Comprehend the operation of Antilock Brake Systems (ABS).
- G. Apply knowledge and skills attained to pass the Automotive Service Excellence (ASE) national test for Brakes (A-5).

**IV. COURSE CONTENT:**

- A. Shop safety
  1. Hazardous materials
  2. Material Safety Data Safety Sheets
  3. Machinery Hazards
- B. Shop techniques
  1. Tools
  2. Torque
  3. Fasteners
  4. Brake tube bending and flaring
- C. Brake System Principles
  1. Hydraulics
    - a) Pascal's Theory
    - b) Brake fluids
    - c) Rubber types
  2. Physics of braking

- a) Friction
- b) Weight transfer
- c) Energy
3. Brake lining compositions
  - a) Lining edge codes
  - b) SHA standards and handling guidelines
4. Brakes operation, diagnosis, and service
5. Caliper types
  - a) Fixed calipers
  - b) Floating calipers
6. Disc brake pads
  - a) Wear sensors
  - b) Wear compensation
  - c) Visual inspection
7. Caliper overhaul
  - a) Disassemble
  - b) Inspection
  - c) Reassemble
  - d) Rotating pistons back into calipers
8. Test drive and troubleshooting
  - a) Burning-in new pads
  - b) Cause and correction of brake pad squeal
  - c) Wheel pull and lockup
- D. Parking Brakes
  1. Parking brake standards
  2. Styles of parking brakes
    - a) Integral Disc type
    - b) Auxiliary Drum type
    - c) Standard Drum type
- E. Brake inspection
- F. Rear disc brakes
- G. Parking brake operation and adjustment
- H. Wheel bearing inspection and replacement
  1. Driving type
  2. Non-driving type
- I. Brake lathe operation
  1. Bench style
  2. On the car style
- J. Power Brake Operation, Diagnosis, and service
  1. Types of power assist
    - a) Vacuum booster
    - b) Hydraulic boosters
    - c) Tandem diaphragm boosters
  2. System test
    - a) Operation test
    - b) Leak test
    - c) Check valve test
    - d) Push-rod check
  3. Trouble shooting power boosters

- K. Antilock Brake Systems
  - 1. Safety precautions
  - 2. Theory of operation
  - 3. Skid control
  - 4. Braking distances
  - 5. Brake bleeding
- L. Tires and Braking
- M. Tire construction
  - 1. Size
  - 2. Tread design
  - 3. Tire run out
- N. Wheels and braking
- O. Wheel Bearings and braking
- P. Automotive Service Excellence
  - 1. History of ASE
  - 2. Sample ASE type questions

**V. METHODS OF INSTRUCTION:**

- A. Lecture
- B. Read text book and service manuals
- C. Class and group discussion
- D. Manufacture's video instructions
- E. Lab demonstrations

**VI. TYPICAL ASSIGNMENTS:**

- A. Read assigned chapters and answer questions at the end of each chapter  
Typical Question:  
Explain what causes brake squeal and explain what a technician can do to reduce or eliminate the noise.
- B. Class discussion  
Typical Topic:  
What are the differences and advantages of disc brakes Vs drum brakes?
- C. Review videotape and write overview of the presentation.
- D. Lab assignments:  
Complete task sheets as per NATEF standards, from workshop textbook:  
Typical Assignments:
  - 1. Replace disc pads and machine rotors
  - 2. Write a work order detailing customer's needs
  - 3. Evaluate a customer's vehicle and prepare an accurate cost of repairs.

**VII. EVALUATION(S):**

- A. Methods of evaluation:
  - 1. Review questions and quizzes
  - 2. Mid-term examination
  - 3. Final examination  
Typical Questions:
    - a) Most automobile manufactures recommend what type of brake fluid?
    - b) Draw an illustration of a typical diagonal split brake with all valves.
    - c) What may be the cause of the red "brake" warning lamp to be illuminated on the dashboard while driving?
  - 4. Assigned lab projects as per NATEF standards (Section A through F)
    - a) Perform hydraulic system services (Section A)  
Typical Question:  
Explain why brake fluid must be changed.  
Lab Assignment:  
Complete NATEF task sheets A-1 through A-12.

- b) Overhaul drum brakes systems (Section B)  
Typical Question:  
What are the advantages and disadvantages of drum brakes?  
Lab Assignment:  
Complete NATEF task sheets B-1 through B-7.
  - c) Overhaul disc brake systems. (Section C)  
Typical Question:  
What are the advantages and disadvantages of disc brakes?  
Lab Assignment:  
Complete NATEF task sheets C-1 through C-11.
  - d) Replace power assist units (Section D)  
Typical Question:  
What are two types of power assist units?  
Lab Assignment:  
Complete NATEF task sheets D-1 through D-4.
  - e) Explain parking brake operation. (Section E)  
Typical Question:  
How is the parking brake activated?  
Lab Assignment:  
Complete NATEF task sheets E-1 through E-7.
  - f) Antilock Brake System (Section F)  
Typical Question:  
Which solenoid diverts fluid flow to calipers?  
Lab Assignment:  
Complete NATEF task sheets F-1 through F-8.
5. Writing assignments
- a) Research paper pertaining to automotive technology.
  - b) Compose a work order detailing customer request.
- B. Frequency of evaluation:
- 1. One mid-term examination
  - 2. One final examination
  - 3. Daily lab assignments
  - 4. Bi-weekly text book chapter review questions
  - 5. Four in class quizzes based upon lecture and textbook

**VIII. TYPICAL TEXT(S):**

Check Chart Publications, Automobile Brake Systems, 3<sup>rd</sup> Edition, Columbus, Ohio: Prentice Hall, 2000

Halderman, James D., Automotive Chassis Systems, 2<sup>nd</sup> Edition, Columbus, Ohio: Prentice Hall, 2000

**IX. OTHER SUPPLIES REQUIRED OF STUDENTS:**

Personal safety gear to include safety glasses, adequate works clothes and shoes providing proper personal protection.