

**Information and Engineering Technology Division  
Automotive Department ATEP Program**

**Course Syllabus**

**Automotive Brakes**

**AMT-1125**

**3 Credits, 2 Class Hours 2 Laboratory Hours**

Instructor Information:

**TEXTBOOKS:**

Modern Automotive Technology , James E. Duffy

- **ISBN-10:** 1590701860
- **ISBN-13:** 978-1590701867

Automotive Technology Curriculum University of Missouri-Columbia

**Course Description**

This is a comprehensive course in types of braking systems and their service requirements. Topics include machine turning of brake drum and rotors, system operation, diagnosis, adjustment, testing, replacement, and repair procedures.. *Prerequisite: AMT 1195.*

**Learning Outcomes**

At the completion of this course, the student will be able to:

1. Locate and name automotive components on an actual automobile.
2. Answer questions on braking hydraulics (including force calculations). Testing in this area will be responses to verbal questions.
3. Identify automotive system component replacement procedures during a formal written examination.

4. “Machine” a rotor and a drum, install brake shoes, disassemble/reassemble a wheel cylinder and caliper.
5. Disassemble/reassemble and bleed a hydraulic system.
6. Adjust hand and “drum-type” brakes.
7. Properly test, diagnose, service, and repair antilock brake systems.

### **Performance Assessment**

The student will be required to pass a series of on-the-car hands-on tasks set by the NATEF task lists (Task V. Brakes)

Evidence that the tasks have been met, the student will identify and interpret brake system concern; determine necessary action. Research the applicable vehicle service information, such as brake system operation, service history, service precautions and technical service bulletins. Locate and interpret vehicle and major component identification numbers (VIN, vehicle certification labels, calibration decals. Diagnose pressure concerns in the brake system using hydraulic principles (Pascal’s Law). Remove, bench bleed, and reinstall master cylinder. Diagnose poor stopping, pulling, or dragging concerns caused by malfunctions in the hydraulic system, determine necessary action. Fabricate and/or install brake lines (double flare and ISO types); replace hoses fittings, and supports as needed. Bleed (manual, pressure, vacuum or surge) brake systems. Remove, clean (using proper safety procedures), inspect, and measure brake drums; determine necessary action. Refinish brake drum. Remove caliper assembly from mounting; clean and inspect for leaks and damage to caliper housing. Clean and inspect caliper mounting and slides for wear damage, remove, clean and inspect caliper assemble; inspect parts for wear, rust, scoring and damage. Replace seal, boot and damaged or worn parts. Clean, inspect and measure rotor with a dial indicator and a micrometer; follow manufacturer’s recommendations in determining need to machine or replace. Remove and reinstall rotor. Refinish rotor according to manufacturer’s recommendations. Install wheel, torque lug nuts, and make final checks and adjustments. Check parking brake operation, operation of parking brake indicator light and operation of brake stop light systems. Identify and inspect antilock brake system (ABS) components. Diagnose poor stopping, wheel lock-up, abnormal pedal feel or pulsation and noise concerns caused by the antilock brake system. Bleed the antilock brake system front and rear hydraulics circuits. Test, diagnose and service ABS speed sensors, toothed ring (tone wheel) and circuits using a digital multimeter (including output signal, resistance, shorts to voltage/ground and frequency data. Diagnose antilock brake system braking concerns caused by vehicle modifications (tire size, curb height, final drive ratio, etc.) Identify traction control system components. All these tasks will be observed in a one-on-one basis, when in the shop lab.

## Grading Policy

Grading of class:		Letter grade conversions:
Assignment /Lab Sheets	10%	A (90-100)
Unit & Mid-Term Tests (4)	20%	B (80-89)
Hands-on Components	40%	C (70-79)
Final Test	30%	D (60-69)

Lab Sheets are based on hands-on performance tasks per the NATEF task list.

**NOTE:** If the AVERAGE TOWARD FINAL GRADE is 90 or above (+ - assignments and lab sheets) you do not have to take the FINAL TEST.

If you have to take the FINAL TEST, the AVERAGE TOWARD FINAL GRADE and FINAL TEST are averaged for the FINAL LETTER GRADE.

## Laboratory Guidelines

- **Horseplay will not be tolerated**
- **When working under an automobile, you must use a creeper**
- **Use all hand or special tools properly**
- **Do not sit in an automobile unless you are making a check or test that requires you to**
- **Do not run the radio or change radio setting**
- **Do not move the seat unless necessary**
- **You must use fender covers when working under the hood**
- **Do not use any part of an automobile for a work bench**
- **Every automobile must have a work order on it**
- **Every automobile jacked up must have jack stands under it**
- **You must wear safety glasses when doing the following**
  - Turning a drum/rotor
  - Grinding
  - Re-facing a valve
  - Balance a wheel
  - Drilling holes
  - Use a blow gun safely

## Supplemental material

All Computer Based Training CD's and Web Based Training IDLs are required to be completed for hands-on certification to be granted. Lab workbooks must be completed.

## COURSE OUTLINE:

### Week 1 – System Operation, Component Identification

1. Correctly describe how brake system operates

2. Properly identify and name all components used in the brake system

#### Week 2 – Hydraulics

3. Correctly describe the effects of hydraulics on braking.
4. Properly use formulas to figure force at wheel cylinders, calipers and master cylinder

#### Week 3-4 – Drum Brakes, Disc Brakes

5. Identify and describe operation of leading/trailing brake system
6. Identify and describe operation of duo-servo brake system
7. Properly check and change drum brakes
8. Correctly describe operation of disc brakes
9. Properly check and change disc brakes

#### Week 5 – Component Operation Function

10. Correctly describe operation of the following brake system components: master cylinder, wheel cylinder, caliper, proportioning valve, metering valve, vacuum booster

#### Week 6 – Component Replacing

11. Properly check, replace or repair the following brake system components: master cylinder, wheel cylinder, caliper, proportioning valve, metering valve, vacuum booster

#### Week 7 – Brake Lathe Operation

12. Correctly operate a brake lathe
13. Properly turn drums and rotors

#### Week 8 – Complete Brake Job.

14. Correctly do a complete brake job.

## I ATTENDANCE/TARDINESS

“Class attendance and punctuality requirements are contracted between the faculty and the students, through specific expectations for attendance and punctuality and specific consequences that are outlined by individual faculty members in the printed syllabus for each course. Students are expected to attend classes regularly and on time and are responsible for giving explanations/rational for absences and lateness directly to the faculty member for each course in which they are enrolled. In cases where student absences are the result of emergency circumstances (e.g., death in the family, a student’s serious injury or incapacitating illness), for which students are unable to make immediate contact with faculty, the student may contact the Dean of Students Office for assistance in providing such immediate notification to faculty. However, the student remains responsible for verifying the emergency circumstances to faculty and for discussing arrangements with faculty for completion of course work requirements.

In accordance with Nashville State’s attendance policy, **any student who does not attend class or contact the instructor for two consecutive weeks will be dropped from the class with a WF.** This grade counts the same as an F for figuring Grade Point Averages (GPA). If there is some compelling reason for an extended absence, be sure to get in touch with each of your instructors as early as possible.

Attendance is kept for each class meeting. If you must be absent, you should notify your instructor before the class meeting if at all possible. **Students are expected to be on time for all class/lab meeting.**

## II CHEATING/PLAGIARISM

Everyone is expected to do homework and other class assignments independently. Students may study with classmates and are encouraged to form study groups for the purpose of helping each other understand class material, but assignments that are submitted to the instructor should be the student’s own work. **Copying another student’s work is considered cheating. Allowing another student to copy your work is also considered cheating.** Any person cheating on class work, homework or a test will be penalized as follows:

**First Offense- all students involved will receive a zero (0) on that assignment.**

**Second Offense- all students involved will receive an F in the course.**

**Copying computer files is also a form of cheating.** If you are working on the same assignment as other students, then you would be wise not to leave copies of your files on the hard drive, they are not yours to copy and if you do copy them, you will be penalized as stated above.

**Plagiarism** ( quoting material from someone else without referencing the source) is also not acceptable. If you quote information **from any source** (including the internet), then you should always cite the source.

### III CELLULAR PHONES/PAGERS

The use of cellular telephones and pagers in the classroom is **prohibited**. If there is some special need for a brief period of time, the instructor should be notified before the device is brought to class, and then the device should be set to vibrate. The student should sit close to the door, and quietly leave the room before answering the call. **Every effort should be made to cause minimal disruption in the class.** Students violating this policy will be asked not to return to the classroom.

### IV INTERNET USAGE POLICY

Students using Nashville State's computing facilities are responsible for using them in an ethical, legal, efficient and effective manner consistent with the mission of the college.

### V ADA

"Nashville State complies with the Americans with Disabilities Act. If you wish to request any special accommodations for any courses in which you are enrolled, contact the Student Disabilities Office. Such services must have proof of documentation that is not over three years old. Contact the Disabilities Coordinator at 353-3592."

### VI Academic and Classroom Misconduct

**"Nashville State has a zero tolerance policy for disruptive conduct in the classroom.** Please consult your Student Handbook for more specific details. The instructor has primary responsibility for control over classroom behavior and maintenance of academic integrity. He/she can order temporary removal or exclusion from the classroom of any student engaged in disruptive conduct or conducts which violates the general rules and regulations of the College. Disruptive behavior in the classroom may be defined as, but not limited to, behavior that obstructs or disrupts the learning environment (e.g., offensive language, harassment of students and professors, repeated outbursts from a student which disrupt the flow of instruction or prevent concentration on the subject taught, failure to cooperate in maintaining classroom decorum, etc.) the continued use of any electronic or other noise or light emitting device which disrupts others (e.g. disturbing noises from beepers, cell phones, palm pilots, lap-top computers, games, etc.)."