SYLLABUS

DIVISION: Business & Engineering Technologies REVISED 2012

CURRICULA IN WHICH COURSE IS TAUGHT: Automotive Analysis and Repair

COURSE NUMBER/TITLE: AUT 265 Automotive Braking Systems

CREDIT HOURS: 3 HOURS/WEEK LECTURE: 2 HOURS/WEEK LAB: 3
LEC/LAB COMB: 5

I. CATALOG DESCRIPTION:

Presents operation, design, construction, repair, and servicing of braking systems. Explains uses of tools and test equipment, evaluation of test results, estimation of repair costs for power, standard, and disc brakes.

II. RELATIONSHIP OF THE COURSE TO CURRICULA OBJECTIVES IN WHICH IT IS TAUGHT:

Students will:

I. Demonstrate technical competencies and skills in automotive braking systems.
II. Demonstrate punctuality and reliability acceptable to the automotive repair industry.
III. Demonstrate an understanding of the economic costs of automotive vehicle repair.
IV. Use safety equipment and procedures required for the operations being performed.
V. Read and interpret technical information required for projects and assignments.
VI. Demonstrate and maintain a clean, orderly, safe and attractive work place and maintain a personal appearance that will enhance that work place.

III. REQUIRED BACKGROUND:

No previous courses required
Course textbook must be available for use and study
A basic hand tool set must be available for lab projects

IV. COURSE CONTENT:

Physics of braking
Drum brake systems
Disc brake systems
Basic hydraulic systems
Hydraulic brake systems
Mechanical brake systems
Power brake systems
Stop light systems
Drum and disc reconditioning
Brake friction element replacement
Brake hydraulic reconditioning
Brake adjusting
Diagnoses of brake problems

V. LEARNER OUTCOMES:

EVALUATED BY WRITTEN TESTS (T or F, short answer, multiple choice)

1. Identify the physics principles applied to braking systems.
2. Solve brake system hydraulic problems.
3. List parts of drum brake systems.
4. List parts of disc brake systems.
5. Identify differences in drum brake design.
6. Identify differences in disc brake design.
7. List parts of brake hydraulic systems.
8. Identify failures and corrections of hydraulic failures.
9. List parts of a power brake system.
10. Identify failures and corrections of power brake failures.
11. Identify characteristics of hydraulic brake fluid.
12. 75% of students will be able to complete these assignments

VI. EVALUATION:

BY LABORATORY PRACTICE: (Shop instructor observation)

ASE Task List

Brakes

Tasksheet	*ASE Priority*	*ASE Task Number*	*Course Reference*
A. General brake systems diagnosis			
C229 Identify and interpret brake system concern; determine necessary action.	P1	5A01	**AUT-265**
C230 Research applicable vehicle and service information, such as brake system operation, vehicle service history, service precautions, and technical service bulletins.	P1	5A02	**AUT-265**
C231 Locate and interpret vehicle and major component identification numbers (VIN, vehicle certification labels, calibration decals).	P1	5A03	**AUT-265**
B. Hydraulic system diagnosis & repair			
C232 Diagnose pressure concerns in the brake system using hydraulic principles (Paschal's Law).	P1	5B01	**AUT-265**
C233 Measure brake pedal height; determine necessary action.	P2	5B02	**AUT-265**
C234 Check master cylinder for internal and external leaks and proper operation; determine necessary action.	P2	5B03	**AUT-265**
C235 Remove, bench bleed, and reinstall master cylinder.	P1	5B04	**AUT-265**
C236 Diagnose poor stopping, pulling or dragging concerns caused by malfunctions in the hydraulic system; determine necessary action.	P1	5B05	**AUT-265**

C237	Inspect brake lines, flexible hoses, and fittings for leaks, dents, kinks, rust, cracks, bulging or wear; tighten loose fittings and supports; determine necessary action.	P2	5B06	**AUT-265**
C238	Fabricate and/or install brake lines (double flare and ISO types); replace hoses, fittings, and supports as needed.	P2	5B07	**AUT-265**
C239	Select, handle, store, and fill brake fluids to proper level.	P1	5B08	**AUT-265**
C240	Inspect, test, and/or replace metering (hold-off), proportioning (balance), pressure differential, and combination valves.	P2	5B09	**AUT-265**
C241	Inspect, test, and adjust height (load) sensing proportioning valve.	P3	5B10	**AUT-265**
C242	Inspect, test, and/or replace components of brake warning light system.	P3	5B11	**AUT-265**
C243	Bleed (manual, pressure, vacuum or surge) brake system.	P1	5B12	**AUT-265**
C244	Flush hydraulic system.	P3	5B13	**AUT-265**
C. Drum brake diagnosis & repair				
C245	Diagnose poor stopping, noise, pulling, grabbing, dragging or pedal pulsation concerns; determine necessary action.	P1	5C01	**AUT-265**
C246	Remove, clean (using proper safety procedures), inspect, and measure brake drums; determine necessary action.	P1	5C02	**AUT-265**
C247	Refinish brake drum.	P1	5C03	**AUT-265**
C248	Remove, clean, and inspect brake shoes, springs, pins, clips, levers, adjusters/self-adjusters, other related brake hardware, and backing support plates; lubricate and reassemble.	P1	5C04	**AUT-265**
C249	Remove, inspect, and install wheel cylinders.	P2	5C05	**AUT-265**
C250	Pre-adjust brake shoes and parking brake before installing brake drums or drum/hub assemblies and wheel bearings.	P1	5C06	**AUT-265**
C251	Install wheel, torque lug nuts, and make final checks and adjustments.	P1	5C07	**AUT-265**
D. Disc brake diagnosis & repair				
C252	Diagnose poor stopping, noise, pulling, grabbing, dragging or pedal pulsation concerns; determine necessary action.	P1	5D01	**AUT-265**
C253	Remove caliper assembly from mountings; clean and inspect for leaks and damage to caliper housing; determine necessary action.	P1	5D02	**AUT-265**

C254	Clean and inspect caliper mounting and slides for wear and damage; determine necessary action.	P1	5D03	**AUT-265**
C255	Remove, clean, and inspect pads and retaining hardware; determine necessary action.	P1	5D04	**AUT-265**
C256	Disassemble and clean caliper assembly; inspect parts for wear, rust, scoring, and damage; replace seal, boot, and damaged or worn parts.	P2	5D05	**AUT-265**
C257	Reassemble, lubricate, and reinstall caliper, pads, and related hardware; seat pads, and inspect for leaks.	P1	5D06	**AUT-265**
C258	Clean, inspect, and measure rotor with a dial indicator and a micrometer; follow manufacturer's recommendations in determining need to machine or replace.	P1	5D07	**AUT-265**
C259	Remove and reinstall rotor.	P1	5D08	**AUT-265**
C260	Refinish rotor according to manufacturer's recommendations.	P1	5D09	**AUT-265**
C261	Adjust calipers equipped with an integrated parking brake system.	P3	5D10	
C262	Install wheel, torque lug nuts, and make final checks and adjustments.	P1	5D11	**AUT-265**
E. Power assist units diagnosis & repair				
C263	Test pedal free travel with and without engine running; check power assist operation.	P2	5.00E+01	**AUT-265**
C264	Check vacuum supply (manifold or auxiliary pump) to vacuum-type power booster.	P2	5.00E+02	**AUT-265**
C265	Inspect the vacuum-type power booster unit for vacuum leaks; inspect the check valve for proper operation; determine necessary action.	P2	5.00E+03	**AUT-265**
C266	Inspect and test hydro-boost system and accumulator for leaks and proper operation; determine necessary action.	P3	5.00E+04	**AUT-265** **AUT-265**

F. Miscellaneous (wheel bearings, parking brakes, electrical, etc.) diagnosis & repair

C267 Diagnose wheel bearing noises, wheel shimmy, and vibration concerns; determine necessary action.

C268 Remove, clean, inspect, repack, and install wheel bearings and replace seals; install hub and adjust wheel bearings.

C269 Check parking brake cables and components for wear, rusting, binding, and corrosion; clean, lubricate, or replace as needed.

C270 Check parking brake operation; determine necessary action.

C271 Check operation of parking brake indicator light system.

P1	5F01	**AUT-265**
P1	5F02	**AUT-265**
P2	5F03	**AUT-265**
P1	5F04	**AUT-265**
P3	5F05	**AUT-265**

C272	Check operation of brake stop light system; determine necessary action.	P1	5F06	**AUT-265**
C273	Replace wheel bearing and race.	P1	5F07	**AUT-265**
C274	Inspect and replace wheel studs.	P1	5F08	**AUT-265**
C275	Remove and reinstall sealed wheel bearing assembly.	P2	5F09	**AUT-265**
G. Antilock brake & traction control systems				
C276	Identify and inspect antilock brake system (ABS) components; determine necessary action.	P1	5G01	**AUT-265**
C277	Diagnose poor stopping, wheel lock-up, abnormal pedal feel or pulsation, and noise concerns caused by the antilock brake system (ABS); determine necessary action.	P2	5G02	**AUT-237**
C278	Diagnose antilock brake system (ABS) electronic control(s) and components using self-diagnosis and/or recommended test equipment; determine necessary action.	P1	5G03	**AUT-237**
C279	Depressurized high-pressure components of the antilock brake system (ABS).	P3	5G04	Rarely find this type of work
C280	Bleed the antilock brake system's (ABS) front and rear hydraulic circuits.	P2	5G05	**AUT-265**
C281	Remove and install antilock brake system (ABS) electrical/electronic and hydraulic components.	P3	5G06	**AUT-237**
C282	Test, diagnose and service ABS speed sensors, toothed ring (tone wheel), and circuits using a graphing multimeter (GMM)/digital storage oscilloscope (DSO) (includes output signal, resistance, shorts to voltage/ground, and frequency data).	P1	5G07	**AUT-237**
C283	Diagnose antilock brake system (ABS) braking concerns caused by vehicle modifications (tire size, curb height, final drive ratio, etc.).	P3	5G08	**AUT-237**
C284	Identify traction control system components.	P3	5G09	**AUT-237**

VII. The Following General Education Objectives Will Be Addressed in This Course:

Communication
Learning Skills
Critical Thinking
Interpersonal Skills and Human Relations
Understanding Science and Technology