

TEAU 1500 - Brakes (4 Credits)

Course Description

The Brakes course provides theory and hands-on instruction on automotive braking systems while following the industry acceptable standards.

Course Objectives

- Maintain vehicle safety through safe brake maintenance and repairs.
 - Identify and repair hydraulic, disc, and drum brake systems.
 - Identify and repair parking and anti-lock braking systems.
 - Identify and repair traction and stability control systems.
 - Repair brake assist systems.
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Course Outline

- Brake System Fundamentals and Related Systems
 - Master Cylinders, Brake Fluid, and Hydraulic Comp.
 - Power Brake Systems
 - Disc Brakes
 - Drum Brakes
 - Parking Brakes
 - Electrical Braking Systems
 - Advanced Braking Systems
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Textbook & Reading Materials

Cengage Unlimited (1 year subscription), Cengage

Assignments and Assessments

Orientation
Orientation Acknowledgement
Brake Systems Syllabus 2020-21
Remind Txt Group
Automotive Student OE Instructions
Right to Know Agreement
Student Information Sheet
INTERNET USAGE POLICY
Brakes Job Sheet Checklist
Cleaning Expectations
Southwest Technical College Automotive Video Playlist
Student Tool and Equipment Use Waiver
Cell Phone
Instructions
Digital Lab Explanation
Module Breakdown
Module 1 Labs
Module 2 Labs
Module 3 Labs
Module 4 Labs
Module 5 Labs
Module 6 Labs
Module 7 Labs
Module 8 Labs
Cleaning Labs
Cleaning Lab 1
Cleaning Lab 2
Cleaning Lab 3
Cleaning Lab 4
Cleaning Lab 5
Rotor 1.mov
Rotor 2.mov
Drum 1.mov
Drum2.mov
Reading
Brake Pedal Leverage
Using a Micrometer
Disc Brakes
Rear and Front Wheel Cylinders
Chapter 1 Multiple Choice and True-False Quiz
Chapter 1 Labeling Activity
Chapter 1 ASE-Style Review Questions
Chapter 1 Video Questions
Brake Inspection
Replacing Disc Brake Pads
Brake Pedal Pulsation
Bleeding the Brake System
Diagnosing Low Brake Pedal
Diagnosing Brake Pull
Pascal's Law and Hydraulics
Stability Control Basics
Vacuum Booster Operation
Reading

Principles for a Vehicle Braking System
Friction
Chapter 2 Multiple Choice and True-False Quiz
Chapter 2 Video Questions (Classroom)
Reading
Brake Pressure Gauge
Washing Station
Jumper Wire Circuit
Chapter 2 ASE-Style Review Questions
Chapter 2 Video Questions (Shop)
Reading
Pedal Free Play
Chapter 3 Multiple Choice and True-False Quiz
Reading
Lubricating a Bearing
Wheel Alignment Inspection
Chapter 3 ASE-Style Review Questions
Chapter 3 ASE Challenge Questions
Lab 1: Identify and interpret brake system concerns; determine needed action.
Lab 2: Research vehicle service information including fluid type, vehicle service history service precautions, and technical service bulletins.
Lab 3: Describe procedures for performing a road test to check brake system operation including an anti-lock brake system
Lab 4: Install wheel and torque lug nuts
Lab 5 Measure brake pedal height, travel and free play; determine necessary action.
Lab 6 Select, handle, store, and fill brake fluids to proper level; use proper fluid type per manufacturer specification
Lab 7 Diagnosis poor stopping, noise, vibration, pulling, grabbing, dragging, or pulsation concerns; determine necessary action.
Lab 8 Inspect caliper mounting and slides/pins for proper operation, wear, and damage determine needed action.
Lab 9 Lubricate and reinstall caliper, brake pads, and related hardware; seat brake pads and inspect for leaks
Lab 10 Clean and inspect rotor and mounting surface; measure rotor thickness, thickness variation, and lateral runout; determine necessary action.
Lab 11 Remove and reinstall/replace rotor
Lab 12 Refinish rotor off vehicle; measure final rotor thickness and compare with specifications.
Checkpoint Meeting Module 1
End Module 1
Reading
Types of DOT Approved Brake Fluids
Fluid Flow Through Master Cylinder
Check Ball Moves Opening Seal
Chapter 4 Multiple Choice and True-False Quiz
Chapter 4 Labeling Activity
Reading

Check and Adjust Brake Fluid Level
Bleeding Master Cylinder
Chapter 4 ASE-Style Review Questions
Chapter 4 ASE Challenge Questions
Photo Sequence 6: Typical Procedure for Bench Bleeding a Master Cylinder
Reading
Construction and Usage of Steel Brake Lines
Operation of a Brake Proportioning Valve
Proportioning Valve Piston Movement
Chapter 5 Multiple Choice and True-False Quiz
Chapter 5 Labeling Activity
Purpose and Construction of a Brake Proportioning Valve
Proportioning Valve Pressure Split
Chapter 5 ASE-Style Review Questions
Chapter 5 ASE Challenge Questions
Chapter 5 Video and Questions
Chapter 5 Video Questions
Labs 13 Diagnose pressure concerns in the brake system using hydraulic principles.
Labs 14 Check master cylinder for internal/external leaks and proper operation; determine necessary action.
Labs 15 Remove, bench bleed, and reinstall master cylinder
Labs 16 Diagnose poor stopping, pulling or dragging concerns caused by malfunctions in the hydraulic system; determine necessary action.
Labs 17 Inspect brake lines, flexible hoses, and fittings for leaks, dents, kinks, rust, cracks, bulging, wear and loose fittings/supports; determine needed action
Labs 18 Inspect brake lines, flexible hoses, and fittings for leaks, dents, kinks, rust, cracks, bulging, wear and loose fittings/supports
Labs 19 Replace brake lines, hoses, fittings, and supports
Labs 20 Replace brake lines, hoses, fittings, and supports.
Labs 21 Fabricate brake lines using proper material and flaring procedures
Labs 22 identify components of hydraulic brake warning light system
Labs 23 Test brake fluid for contamination
Labs 24 Bleed and/or flush brake system
Labs 25 Bleed and/or flush brake system
Labs 26 Measure and adjust master cylinder pushrod length
Checkpoint Meeting Module 2
End Module 2
Reading
Vacuum and Hydro-boost Power Brake Systems
Air Passing Through Silencer
Chapter 6 Multiple Choice and True-False Quiz
Chapter Activities
Chapter 6 Labeling Activity
Chapter 6 Video and Questions
Chapter 6 Video Questions
Reading
Vacuum Brake Booster Operation

Chapter 6 ASE-Style Review Questions
Chapter 6 ASE Challenge Questions
Photo Sequence 10: Typical Procedure for Vacuum Booster Testing
Chapter 6 Labeling Activity
Diagnosing a Vacuum Brake Booster
Labs 28 Check brake pedal travel with, and without, the engine running to verify proper power booster operation
Labs 29 Identify components of the brake power assist system (vacuum and hydraulic)
check vacuum supply (manifold or auxiliary pump) to vacuum-type booster
Labs 30 Inspect vacuum-type booster unit for leaks; inspect the check-valve for proper operation; determine necessary action.
Labs 31 Inspect and test a hydraulic-assist power booster for leaks and proper operation determine necessary action
Labs 32 Diagnose wheel bearing noises, wheel shimmy, and vibration concerns; determine necessary action
Labs 33 Remove, clean, inspect, repack, and install wheel bearings; replace seals; install hub and adjust bearings
Labs 34 Replace wheel bearing and race
Labs 35 Inspect and replace wheel studs.
Labs 36 Remove, reinstall, and/or replace sealed wheel bearing assembly
Checkpoint Meeting Module 3
End Module 3
Reading
Operation of a Disc Brake System
Brake Pad Construction and Specifications
Chapter 7 Multiple Choice and True-False Quiz
Chapter 7 Labeling Activity
Chapter 7 Video and Questions
Chapter 7 Video Questions
Reading
Disc Brake Rotor Inspection
Replacing Disc Brake Pads
Chapter 7 ASE-Style Review Questions
Chapter 7 ASE Challenge Questions
Photo Sequence 14: Mounting a Floating Rotor (Drum) on a Brake Lathe
Labs 37 Diagnose poor stopping, noise, vibration, pulling, grabbing, dragging, or pedal pulsation concerns; determine necessary action
Labs 38 Remove and clean caliper assembly; inspect for leaks, damage, and wear; determine needed action.
Labs 39 Remove and clean caliper assembly; inspect for leaks, damage, and wear; determine needed action.
Labs 40 Remove, inspect, and/or replace pads and retaining hardware; determine necessary action.
Labs 41 Remove, inspect, and/or replace pads and retaining hardware; determine necessary action.
Labs 42 Lubricate and reinstall caliper, brake pads, and

related hardware; seat brake pads and inspect for leaks

Labs 43 Clean and inspect rotor and mounting surface; measure rotor thickness, thickness variation, and lateral runout; determine necessary action.

Labs 44 Remove and reinstall/replace rotor

Labs 45 Refinish rotor on vehicle; measure final rotor thickness and compare with specifications.

Labs 46 Refinish rotor on vehicle; measure final rotor thickness and compare with specifications.

Labs 47 Refinish rotor on vehicle; measure final rotor thickness and compare with specifications.

Labs 48 Check brake pad wear indicator; determine necessary action

Labs 49 Describe the importance of operating a vehicle to burnish/break-in replacement brake pads according to manufacturers' recommendations

Checkpoint Meeting Module 4

End Module4

Reading

Resulting Rotation Around Hinge

Purpose and Construction of a Brake Backing Plate

Construction and Operation of a Drum Brake Wheel Cylinder

Chapter 8 Multiple Choice and True-False Quiz

Reading

Drum Brake Inspection

Replacing Drum Brake Linings

Photo Sequence 17: Typical Procedure for Removing a Brake Drum from a Rear Axle

Chapter 8 ASE-Style Review Questions

Chapter 8 ASE Challenge Questions

Chapter 8 Video Questions

Labs 50 Diagnose poor stopping, noise, vibration, pulling, grabbing, dragging, or pedal pulsation concerns; determine necessary action

Labs 51 Remove, clean, and inspect brake drum; measure brake drum diameter; determine serviceability.

Labs 52 Remove, clean, and inspect brake drum; measure brake drum diameter; determine serviceability.

Labs 53 Remove, clean, and inspect brake drum; measure brake drum diameter; determine serviceability.

Labs 54 Remove, clean, and inspect brake drum; measure brake drum diameter; determine serviceability.

Labs 55 Refinish brake drum and measure final diameter; compare with specifications.

Labs 56 Refinish brake drum and measure final diameter; compare with specifications.

Labs 57 Refinish brake drum and measure final diameter; compare with specifications.

Labs 58 Remove, clean, inspect, and/or replace brake shoes, springs, pins, clips, levers, adjusters/self-adjusters, other related brake hardware, and baking support plates; lubricate and reassemble.

Labs 59 Remove, clean, inspect, and/or replace brake shoes, springs, pins, clips, levers,

adjusters/self-adjusters, other related brake hardware, and baking support plates; lubricate and reassemble.

Labs 60 Remove, clean, inspect, and/or replace brake shoes, springs, pins, clips, levers,

adjusters/self-adjusters, other related brake hardware, and baking support plates; lubricate and reassemble.

Labs 61 Inspect wheel cylinders for leaks and proper operation; remove and replace as needed

Labs 62 Pre-adjust brake shoes and parking brake; install brake drums or drum/hub

assemblies and wheel bearings; perform final checks and adjustments

Checkpoint Meeting Module 5

End Module 5

Reading

Reading SM CH 9

Operation of an Auxiliary Drum Parking Brake

Parking Brake Operation

Chapter 9 Fill in the Blank Questions

Chapter 9 Labeling Activity

Chapter 9 Video Questions

Chapter 9 Multiple Choice and True-False Quiz

Expanding and Retracting Shoes

Photo Sequence 21: Typical Procedure for Inspecting and Adjusting Rear Drum Parking

Brakes

Chapter 9 Labeling Activity

Chapter 9 ASE-Style Review Questions

Chapter 9 ASE Challenge Questions

Labs 63 Inspect, test, and/or replace components of brake warning light system.

Labs 64 Bleed and/or flush brake system.

Labs 65 Bleed and/or flush brake system.

Labs 66 Install wheel and torque lug nuts.

Labs 67 Diagnosis poor stopping, noise, vibration, pulling, grabbing, dragging, or pulsation concerns; determine necessary action.

Labs 68 Remove and clean caliper assembly; inspect for leaks, damage, and wear determine needed action.

Labs 69 Inspect caliper mounting and slides/pins for proper operation, wear, and damage determine needed action.

Labs 70 Retract and re-adjust caliper piston on an integrated parking brake system

Labs 71 Check parking brake system components for wear, binding, and corrosion; clean, lubricate, adjust and/or replace as needed.

Labs 72 Check parking brake operation and parking brake indicator light system operation;

determine necessary action

Checkpoint Meeting Module 6

End Module 6

Reading2

Analog Waveform

Digital Waveform

Chapter 10 Multiple Choice and True-False Quiz
Chapter 10 Fill in the Blank Questions
Reading
Chapter 10 Video Questions
Chapter 10 ASE-Style Review Questions
Chapter 10 ASE Challenge Questions
Chapter 10 Matching Activity
Labs 74 Bleed and/ or flush brake system.
Labs 75 Bleed and/ or flush brake system.
Labs 76 Diagnosis poor stopping, noise, vibration, pulling, grab'bing, dragging, or pulsatiorn concerns; determine necessary action.
Labs 77 Check operation of brake stop light system.
Labs 78 Identify and inspect elect ronic brake control system components (ABS, TCS,ESC) determine needed action.
Labs 79 Identify traction control/vehicle stability control system components.
Labs 80 Diagnosis poor stopping, wheel lock-up, abnormal pedal feel, unwanted application, and noise concerns associated with the electronic lbrake control system determine needed action.
Labs 81 Diagnosis electronic brake cont rol system elect ronic control(s) and components by retrieving diagnostic trouble codes, and/or using recommended test equipment; determinne needed action.
Labs 82 Depressurize high-pressure components of an electronic brake control system.
Labs 83 Bleed the Electronic Brake Control System Hydraulic Circuits.
Labs 84 Test, diagnose, and service electronic brake control system speed sensors
Checkpoint Meeting Module 7
End Module 7
Reading
Understeering With and Without ESP
Oversteering With and Without ESP
Chapter 11 Multiple Choice and True-False Quiz
Chapter 11 Fill in the Blank Questions
Reading
Chapter 11 Video Questions
Chapter 11 ASE-Style Review Questions
Chapter 11 ASE Challenge Questions
Chapter 11 Labeling Activity
Labs 85 Inspect caliper mounting and slides/pins for proper operation, wear, and damage determine needed action.
Labs 86 Remove, inspect, and/or replace pads and retaining hardware; determine necessary action.
Labs 87 Lubricate and reinstall caliper, brake pads, and related hardware; seat brake pads and inspect for leaks
Labs 88 Clean and inspect rotor and mounting surface; measure rotor thickness, thickness variation, and lateral runout; determine necessary action.
Labs 89 Remove and reinstall/replace rotor
Labs 90 Refinish rotor off vehicle; measure final rotor

thickness and compare with specifications.
Labs 91 Refinish rotor off vehicle; measure final rotor thickness and compare with specifications.
Labs 92 Describe the operation of a regenerative braking system.
Labs 93 Diagnose elect ronic brake control system braking concerns caused by vehicle modifications (tire size, curb height, final drive ratio).
Labs 94 Research applicable vehicle and service information, vehicle service history, service precautions, and technical service bulletins
Labs 95 Demonstrate knowledge of electrical circuits, proper use of a DMM, effects from shorts and grounds, operation of a test light
Labs 96 Use wiring diagrams, test for parasitic drains, test fuses, inspect and test switches, relays, and replace electrical terminal ends
Labs 97 Inspect, Test, and/or replace components of brake warning light system
Checkpoint Meeting Module 8
End Module 8
Brakes Competency Profile 2020
End of Course Survey
Final Exam Review
Final Exam

Subject to change. Please consult your Canvas course for the most current instructions and updates.

Classroom Hours

Mo, Tu, W, Th
8:00 AM - 12:00 PM
1:00 PM - 5:00 PM

Friday
8:00 AM - 12:00 PM

For a full list of course hours visit: [Course Schedule](#)

Instructor Contact Information

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Office Hours: By appointment

Email is the preferred method of communication; you will receive a response within 24 hours during regular business hours.

Canvas Information

Canvas is the where course content, grades, and communication will reside for this course.

- stech.instructure.com
- For Canvas passwords or any other computer-related technical support contact Student Services.
- For regular Hours and Weekdays call (435) 586 - 2899.
- For after Hours & Weekends call (435) 865 - 3929 (Leave a message if no response).

Course Policies

Class attendance is required, this is not an online course. Work at home can be done on Canvas but attendance is required during your scheduled time.

Grade Scale — A: 100 - 90%, B: 89 - 80%, F: 79% or lower.

Cell phones for many have become a distraction. When you are in class or lab we encourage you to keep your cell phones put away in a secure location. If you use ear buds we ask that you only use one so you can still hear the things going on around you. If you are using your phone for things other than school related items, instructors will ask you to put them away. Please follow the direction of your instructors. Those who have been asked to refrain from using your cell phone and fail to do so will be asked to meet with the Director of Transportation and student services will be notified.

The program is designed to provide the student with as much hands-on work as possible. In the automotive industry you may be required to lift heavy objects and stand for hours at a time to complete work required. Technicians deal with chemicals and materials which require caution, these will be identified in the Right to Know Agreement provided to you. You will also be required to use computers to track and complete work.

High School Power School Grades: Quarter student grades will be determined by student progress percentage. Faculty will use the higher percentage of either 1) quarter progress, or 2) cumulative progress for the current training plan year. The progress percentage will be used with the grading scale to determine the minimum grade. High School Grade Scale: The following grading scale will be used to determine a letter grade from the progress percentage:

• A : 94 - 100%	• B : 83 - 86%	• C : 73 - 76%	• D : 63 - 66%
• A- : 90 - 93%	• B- : 80 - 82%	• C- : 70 - 72%	• D- : 60 - 62%
• B+ : 87 - 89%	• C+ : 77 - 79%	• D+ : 67 - 69%	• F : 0 - 59%

Additional Information

InformaCast Statement: Southwest Tech uses InformaCast to ensure the safety and well-being of our students. In times of emergency, such as weather closures and delays, this app allows us to promptly deliver notifications directly to your mobile devices. To stay informed and receive real-time updates, we encourage all students to sign up for notifications. Your safety is our priority, and staying connected ensures a swift response to any unforeseen circumstances. More information and directions for signing up are available at: <https://stech.edu/emergency-notifications/>

Internet Acceptable Use Policy: The student is expected to review and follow the Southwest Technical College Internet Safety Policy at: <https://stech.edu/students/policies/>

Student Code of Conduct Policy: The student is expected to review and follow the Southwest Technical College Student Code of Conduct Policy at: <https://stech.edu/students/policies/>

Accommodations: Students with medical, psychological, learning, or other disabilities desiring accommodations or services under ADA, must contact the Student Services Office. Student Services determines eligibility for and authorizes the provision of these accommodations and services. Students must voluntarily disclose that they have a disability, request an accommodation, and provide documentation of their disability. Students with disabilities may apply for accommodations, based on an eligible disability, through the Student Services office located at 757 W. 800 S., Cedar City, UT 84720, and by phone at (435) 586-2899. No diagnostic services are currently available through Southwest Technical College.

Safety and Building Maintenance: The College has developed and follows a variety of plans to ensure the safe and effective operation of its facilities and programs. The following plans are available online:

1) Facilities Operations and Maintenance Plan; 2) Technical Infrastructure Plan; and 3) Health and Safety Plan.

Withdrawals and Refunds: Please refer to the Southwest Technical College Refund Policy at: <https://stech.edu/students/policies/>

Any high school or adult student, who declares a technical training objective is eligible for admission at Southwest Technical College (Southwest Tech). Program-specific admissions requirements may exist and will be listed on the Southwest Tech website. A high school diploma or equivalent is not required for admission but is mandatory for students seeking Title IV Federal Financial Aid.

Non-Discriminatory Policy: Southwest Technical College affirms its commitment to promote the goals of fairness and equity in all aspects of the educational enterprise, and bases its policies on the idea of global human dignity.

Southwest Tech is committed to a policy of nondiscrimination. No otherwise qualified person may be excluded from participation in or be subjected to discrimination in any course, program or activity because of race, age, color, religion, sex, pregnancy, national origin or disability. Southwest Technical College does not discriminate on the basis of sex in the education programs or activities that it operates, as required by Title IX and 34 CFR part 106. The requirement not to discriminate in education programs or activities extends to admission and employment. Inquiries about Title IX and its regulations to STECH may be referred to the Title IX Coordinator, to the Department of Education, and/or to the Office for Civil rights.

If you believe you have experienced discrimination or harassment on our campus, please contact the Title IX Coordinator, Cory Estes: cestes@stech.edu, (435) 865-3938.

For special accommodations, please contact the ADA Coordinator, Cyndie Tracy: ctracy@stech.edu, (435) 865-3944.

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