COURSE SYLLABUS

LAST REVIEW	Fall 2022
COURSE TITLE	Brakes I
COURSE NUMBER	AUTT-0152
DIVISION	Career and Technical Education
DEPARTMENT	AUTT
CIP CODE	47.0604
CREDIT HOURS	3
CONTACT HOURS/WEEK	Class: 1 Lab: 4
PREREQUISITES	AUTT-0103
COREQUISITES	None
COURSE PLACEMENT	None

COURSE DESCRIPTION

In this course students will study and perform tasks from the National Automotive Technicians Education Foundation's (NATEF) Maintenance and Light Repair (MLR) Program. Class content will include a thorough and detailed study of brake system theory and functional operation and principles of hydraulic systems as it applies to braking system operation. Practical applications of brake work including complete system service of disc and drum brake systems, parking brake systems, power assist devices and machining of brake disc and drum. All students will successfully complete each element of personal safety training before working in the Automotive Laboratory.

PROGRAM ALIGNMENT

This course is part of a program aligned through the Kansas Board of Regents and Technical Education Authority. For more information, please visit: https://kansasregents.org/workforce_development/program-alignment

PROGRAM LEARNING OUTCOMES

1 Demonstrate proper safety practices in an automotive shop environment.
2. Demonstrate workplace skills associated with a professional automotive shop.
3. Describe the fundamental elements of automotive technology including service information, tools, equipment, and maintenance procedures.

TEXTBOOKS

http://kckccbookstore.com/

METHODS OF INSTRUCTION

A variety of instructional methods may be used depending on content area. These include but are not limited to: lecture, multimedia, cooperative/collaborative learning, labs and demonstrations, projects and presentations, speeches, debates, panels, conferencing, performances, and learning experiences outside the classroom. Methodology will be selected to best meet student needs.

COURSE OUTLINE

I. Research Applicable Vehicle and Service Information
   A. Service precautions
   B. Vehicle service history
   C. Service information
   D. Technical service bulletins
   E. Vehicle and major component identification numbers
II. Pressure
   A. Pressure testing
   B. Pascal's law
III. Diagnose and Determine Appropriate System Pressure Tests Utilizing Service Specifications
   A. Road testing for diagnostics
      1. Brake operation
      2. ABS operation
   B. Diagnosing pressure concerns
   C. Measure brake pedal
      1. Height
      2. Travel
      3. Free play
   D. Leaks
   E. Master cylinder
   F. Diagnose
      1. Poor stopping
      2. Pulling
      3. Dragging concerns
      4. Malfunctions in the hydraulic system
      5. Noises
      6. Pulling
      7. Dragging
      8. Pulsation
   G. Brake lines and hoses
      1. Flexible hoses
      2. Fittings
      3. Damage
      4. Replacing brake lines
      5. Fabrication

6. Flaring procedures
   H. Brake fluids
   I. Combination valves
   J. Brake warning light
   K. Bleeding and/or flushing
   L. Brake fluid contamination

IV. Drum Brake Service
   A. Measurement
   B. Refinishing
   C. Adjustments
   D. Hardware
   E. Wheel cylinders
   F. Backing plates
   G. Self adjusters

V. Disc Brake Service
   A. Slides
   B. Pads
   C. Hardware
   D. Caliper
   E. Lubrication
   F. Rotor
      1. Thickness
      2. Run out
      3. Parallelism

VI. Power Assist
   A. Pedal travel in run and no run dimensions
   B. Vacuum supply
   C. Booster types

VII. Parking Brake Service
   A. Types
   B. Cables
      1. Wear
      2. Binding
      3. Corrosion
      4. Cleaning and lubrication
   C. Adjustments
   D. Component replacement

VIII. Wheel Bearings and Hub Assemblies
   A. Preload
   B. Lubrication
   C. Repacking
   D. Adjust bearings.
   E. Replace wheel bearing and race
   F. Replacing wheel studs

G. Sealed wheel bearings

COURSE LEARNING OUTCOMES AND COMPETENCIES
Upon successful completion of this course, the student will:

A. Explain the elements of general brake service.
   1. Research applicable vehicle and service information, vehicle service history, service precautions and technical service bulletins.
   2. Describe procedure for performing a road test to check brake system operation, including an anti-lock brake system (ABS).
   3. Install wheel and torque lug nuts.

B. Summarize hydraulic brake systems.
   4. Measure brake pedal heights, travel, and free play (as applicable); determine necessary action.
   5. Check master cylinder for external leaks and proper operation.
   6. Inspect brake lines, flexible hoses, and fittings for leaks, dents, kinks, rust, cracks, bulging, wear, loose fittings and supports; determine necessary action.
   7. Select, handle, store and fill brake fluids to proper level.
   8. Identify Components of brake warning light system.
   9. Bleed and/or flush brake system.
   10. Test brake fluid for contamination.

C. Explain the elements of drum brake operation.
   11. Remove, clean, inspect, and measure brake drum diameter; determine necessary action.
   12. Refinish brake drum and measure final drum diameter; compare with specifications.
   13. Remove, clean, and inspect break shoes, springs, pins, clips, levers, adjusters/self-adjusters, other related brake hardware, and backing support plates; lubricate and reassemble.
   14. Inspect wheel cylinders for leaks and proper operation; remove and replace as needed.
   15. Pre-adjust brake shoes and parking brake; install brake drums or drum/hub assemblies and wheel bearings; make final checks and adjustments.

D. Explain the elements of disc brake operation.
   16. Remove and clean caliper assembly, inspect for leaks and damage/wear to caliper housing; determine necessary action.
   17. Clean and inspect caliper mounting and slides/pins for proper operation, wear and damage; determine necessary action.
   18. Remove, inspect, and replace pads and retaining hardware; determine necessary action.
   19. Lubricate and reinstall caliper, pads and related hardware; seat pads and inspect for leaks.

20. Clean and inspect rotor, measure rotor thickness, thickness variation, and lateral run-out; determine necessary action.
21. Remove and reinstall rotor.
22. Refinish rotor on vehicle; measure final rotor thickness and compare with specifications.
23. Refinish rotor off vehicle; measure final rotor thickness and compare with specifications.
24. Retract and re-adjust caliper piston on an integral parking brake system.
25. Check brake pad wear indicator; determine necessary action.
26. Describe importance of operating vehicle to burnish/break-in replacement brake pads according to manufacturer's recommendations.

E. Summarize the elements of power assist brakes.
27. Check brake pedal travel with, and without, engine running to verify proper power booster operation.
28. Check vacuum supply (manifold or auxiliary pump) to vacuum-type power booster.

F. Describe miscellaneous elements of automotive brakes
29. Remove, clean, inspect, repack, and install wheel bearings; replace seals; install hub and adjust bearings.
30. Check parking brake cables and components for wear, binding, and corrosion; clean, lubricate, adjust or replace as needed.
31. Check parking brake operation and parking brake indicator light system operation; determine necessary action.
32. Check operation of brake stop light system.
33. Replace wheel bearing and race.
34. Inspect and replace wheel studs.

G. Describe how electronic brakes, traction, and stability control systems.
35. Identify traction control/vehicle stability control system components.
36. Describe the operation of a regenerative braking system.

ASSESSMENT OF COURSE LEARNING OUTCOMES AND COMPETENCIES
Student progress is evaluated through both formative and summative assessment methods. Specific details may be found in the instructor's course information document.

COLLEGE POLICIES AND PROCEDURES
Student Handbook
https://www.kckcc.edu/files/docs/student-resources/student-handbook-and-code-of-conduct.pdf

College Catalog
https://www.kckcc.edu/academics/catalog/index.html

College Policies and Statements
https://www.kckcc.edu/about/policies-statements/index.html

Accessibility and Accommodations
https://www.kckcc.edu/academics/resources/student-accessibility-support-services/index.html.