

AT R150: AUTOMOTIVE BRAKING SYSTEMS

Originator

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College

Oxnard College

Discipline (CB01A)

AT - Automotive Technology

Course Number (CB01B)

R150

Course Title (CB02)

Automotive Braking Systems

Banner/Short Title

Automotive Braking Systems

Credit Type

Credit

Start Term

Fall 2020

Formerly

AT R018 - Automotive Brake Systems

AT R018L - Automotive Brake Systems Lab

Catalog Course Description

This course is for the automotive student who wants to understand automotive braking systems, including hydraulic and friction principles. This course will study drum and disc brake systems showing how the systems function. The course will cover computerized anti-lock brake controls giving students skills in diagnosis and repair with these systems. Preparation for the ASE certification test is included.

Taxonomy of Programs (TOP) Code (CB03)

0948.00 - *Automotive Technology

Course Credit Status (CB04)

D (Credit - Degree Applicable)

Course Transfer Status (CB05) (select one only)

B (Transferable to CSU only)

Course Basic Skills Status (CB08)

N - The Course is Not a Basic Skills Course

SAM Priority Code (CB09)

C - Clearly Occupational

Course Cooperative Work Experience Education Status (CB10)

N - Is Not Part of a Cooperative Work Experience Education Program

Course Classification Status (CB11)

Y - Credit Course

Educational Assistance Class Instruction (Approved Special Class) (CB13)

N - The Course is Not an Approved Special Class

Course Prior to Transfer Level (CB21)

Y - Not Applicable

Course Noncredit Category (CB22)

Y - Credit Course

Funding Agency Category (CB23)

Y - Not Applicable (Funding Not Used)

Course Program Status (CB24)

1 - Program Applicable

General Education Status (CB25)

Y - Not Applicable

Support Course Status (CB26)

N - Course is not a support course

Field trips

May be required

Grading method

Letter Graded

Alternate grading methods

Credit by exam, license etc.

Does this course require an instructional materials fee?

No

Repeatable for Credit

No

Is this course part of a family?

No

Units and Hours

Carnegie Unit Override

No

In-Class

Lecture

Minimum Contact/In-Class Lecture Hours

87.5

Maximum Contact/In-Class Lecture Hours

87.5

Activity

Laboratory

Minimum Contact/In-Class Laboratory Hours

52.5

Maximum Contact/In-Class Laboratory Hours

52.5

Total in-Class

Total in-Class

Total Minimum Contact/In-Class Hours

140

Total Maximum Contact/In-Class Hours

140

Outside-of-Class

Internship/Cooperative Work Experience

Paid

Unpaid

Total Outside-of-Class

Total Outside-of-Class

Minimum Outside-of-Class Hours

175

Maximum Outside-of-Class Hours

175

Total Student Learning

Total Student Learning

Total Minimum Student Learning Hours

315

Total Maximum Student Learning Hours

315

Minimum Units (CB07)

6

Maximum Units (CB06)

6

Advisories on Recommended Preparation

AT R110 and AT R115

Student Learning Outcomes (CSLOs)

Upon satisfactory completion of the course, students will be able to:	
1	Identify common fractions used in the automotive field and convert them to their decimal equivalent.
2	Demonstrate how to correctly lift vehicles using various common methods found in an automotive repair facility.
3	Identify the following the environmental safety rules and regulations: Shop safety, personal safety, hazardous material safety, air bag safety, power tools, and typical equipment safety.
4	Industry standard measuring tools, such as a micrometer and dial caliper, to determine acceptable tolerances for common automotive components.
5	Properly perform brake service on disc brakes, drum brakes, and hydraulic systems.

Course Objectives

Upon satisfactory completion of the course, students will be able to:	
1	Identify safety hazards in an automotive repair shop.
2	Describe and demonstrate proper customer relations
3	Explain the theory of drum and disc conventional braking systems.
4	Explain the difference between front and rear drum, disc combination braking systems.
5	Compare the conventional and electronic anti-lock brake systems.
6	Identify conventional and anti-lock brake components.
7	Compare four-wheel disc brake form conventional drum disc combination systems.
8	Compare four-wheel disc brake form conventional drum disc combination systems.
9	Perform service writing.
10	Diagnose operation of drum and disc conventional braking subsystems.
11	Perform brake inspection and make proper brake adjustments.
12	Diagnose and evaluate electronic anti-lock system problem.

- 13 Diagnose the effects of braking on suspension components.
- 14 Perform multiple industry standard brake-bleeding procedures.
- 15 Perform brake drum and disc rotor component inspection and machining

Course Content

Lecture/Course Content

1. Shop Operation / Safety / Customer Relations
 - a. Customer relations
 - b. Brake lathe operation (on and off the vehicle)
 - c. Personal safety
 - d. Fire safety
 - e. Fire extinguishers
 - f. Hazardous materials
2. Hydraulic System and Service
 - a. Definition and purpose
 - b. Brake fluids and precautions
 - c. System bleeding conventional
 - d. Vacuum bleeding
 - e. Pressure bleeding
 - f. Brake lines and fittings
 - g. Master cylinder
 - h. Anti-lock master cylinder service
 - i. Wheel cylinder service
 - j. Disc caliper service
 - k. Hydra-boost assist operation
3. Conventional Braking Systems
 - a. Manual brake systems
 - b. Combination braking systems
 - c. Power brake systems
 - d. Parking brake operation
 - e. Wheel bearing service
 - f. Diagnosis and troubleshooting
4. Computerized Brake System Controls
 - a. ABS anti-lock brake system controls
 - b. Data link connections
 - c. ABS diagnostics
 - d. Four-wheel anti-lock disc brakes
 - e. Wheel speed sensors
 - f. Diagnosis and troubleshooting
5. Hydraulic Valves
 - a. Metering valve
 - b. Proportioning valve
 - c. Height-sensing valve
 - d. Combination valve
 - e. Pressure differential
 - f. Hydraulic pressure control without valves

Laboratory or Activity Content

1. Demonstrate shop Operation / Safety / Customer Relations
 - a. Customer Relations
 - b. Equipment Safety
 - c. Personal Safety
 - d. Fire Safety
 - e. Fire Extinguishers
 - f. Hazardous Materials
2. Demonstrate Hydraulic System and Service

- a. Definition and Purpose
- b. Types of Brake Fluids
- c. Master Cylinder Overhaul
- d. Wheel Cylinder Overhaul
- e. Disc Caliper Overhaul
- f. System Bleeding Conventional
- g. Vacuum Bleeding
- h. Pressure Bleeding
- i. Brake Lines and Fittings
- j. Anti-lock Master Cylinder Service
- 3. Demonstrate Conventional Braking System
 - a. Manual Brake Systems
 - b. Combination Brake Systems
 - c. Power Brake Systems Service
 - d. Parking Brake Service
 - e. Wheel Bearing Service
 - f. Diagnosis and Troubleshooting
- 4. Demonstrate Brake Drum and Rotor Service
 - a. Drum Machining
 - b. Rotor Machining
 - c. On-the-car Rotor Machining
 - d. Drum and Disc Rotor Diagnosis
- 5. Demonstrate ABS Computerized Brake System Controls
 - a. ABS Anti-Lock Brake System Controls
 - b. ABS Data Diagnosis
 - c. ABS Maintenance and Repair
 - d. Four-Wheel Anti-Lock Disc Brakes
 - e. ABS Hydraulic Service
 - f. ABS Wheel Speed Sensors
 - g. ABS Diagnosis and Troubleshooting
- 6. Demonstrate Hydraulic Valves
 - a. Metering Valve
 - b. Proportioning Valve
 - c. Height-Sensing Valve
 - d. Combination Valve
 - e. Pressure Differential
 - f. Hydraulic Pressure Control Without Valves

Methods of Evaluation

Which of these methods will students use to demonstrate proficiency in the subject matter of this course? (Check all that apply):

Problem solving exercises
 Skills demonstrations
 Written expression

Methods of Evaluation may include, but are not limited to, the following typical classroom assessment techniques/required assignments (check as many as are deemed appropriate):

Essay exams
 Group projects
 Individual projects
 Objective exams
 Oral presentations
 Projects
 Problem-Solving Assignments
 Problem-solving exams

Instructional Methodology

Specify the methods of instruction that may be employed in this course

Audio-visual presentations

Collaborative group work
Class activities
Class discussions
Case studies
Field experience/internship
Field trips
Group discussions
Guest speakers
Laboratory activities
Lecture

Describe specific examples of the methods the instructor will use:

Instructor will use textbook information, pop quizzes, tool identification, hands on practice, video presentations and group work as needed.

When performing group work, instructor will assign key terms to identify and define. students will pick a scribe and a presenter, students will then present in front of class and explain their findings. Instructor will guide and facilitate any additional learning or clarification.

Representative Course Assignments

Writing Assignments

1. Students will be required to answer questions at the end of each chapter.
2. Students will be required to complete written reports about an inspection of a brake system.
3. Students will record group work and submit the copy to district LMS for grading.
4. Students will use task sheets and record their findings.

Reading Assignments

1. Students will be required to do outside readings in professional journals such as Motor Service Journal and Motor Age Magazine in addition to the textbook assignments.
2. Students will be required to access brake service information from computer program systems such as Alldata and Mitchell in the classroom.

Skills Demonstrations

1. Students will be required to complete labs and during some of those labs students must use tools and demonstrate the skill, such as:
 - a. Disc brake pad replacement
 - b. Brake fluid testing
 - c. Drum brake repairs
 - d. Machining of rotors
 - e. Machining of drums
 - f. On-car brake lathe use
 - g. Brake problem diagnoses

Other assignments (if applicable)

1. Students will be required to do research from automotive industry websites such as Ford and Toyota, regarding the latest suspension repair techniques used in today's vehicles
2. Students will be required to do research from automotive tool company websites regarding the latest tools for communication with the vehicle body computer.

Outside Assignments

Representative Outside Assignments

Students will research vehicle problem using the systems located on the web. Students will complete the Suite of courses on SP2.org and earn each certificate to complete their portfolios. Students will create their own training program at Gates training .com.Each student will complete all the certificates and turn them in either by canvas or in person to Instructor.

Articulation

Comparable Courses within the VCCCD

AT R018 - Automotive Brake Systems
AT R018L - Automotive Brake Systems Lab

District General Education**A. Natural Sciences****B. Social and Behavioral Sciences****C. Humanities****D. Language and Rationality****E. Health and Physical Education/Kinesiology****F. Ethnic Studies/Gender Studies****CSU GE-Breadth****Area A: English Language Communication and Critical Thinking****Area B: Scientific Inquiry and Quantitative Reasoning****Area C: Arts and Humanities****Area D: Social Sciences****Area E: Lifelong Learning and Self-Development****CSU Graduation Requirement in U.S. History, Constitution and American Ideals:****IGETC****Area 1: English Communication****Area 2A: Mathematical Concepts & Quantitative Reasoning****Area 3: Arts and Humanities****Area 4: Social and Behavioral Sciences****Area 5: Physical and Biological Sciences****Area 6: Languages Other than English (LOTE)****Textbooks and Lab Manuals****Resource Type**

Textbook

DescriptionHalderman, James D. (2017). *Automotive Chassis Systems (7th)*. Prentice Hall. 0134064453**Resource Type**

Textbook

DescriptionHalderman, James D. (2017). *Automotive Chassis Systems Correlated Task Sheets (7th)*. Prentice Hall. 0134072375**Primary Minimum Qualification**

AUTOMOTIVE TECHNOLOGY

Additional local certifications required

MLR, A5, & A6

Review and Approval Dates

Department Chair

10/03/2019

Dean

10/03/2019

Technical Review

10/09/2019

Curriculum Committee

10/09/2019

DTRW-I

10/10/2019

Curriculum Committee

11/13/2019

Board

12/17/2019

CCCCO

MM/DD/YYYY

Control Number

CCC000593788

DOE/accreditation approval date

MM/DD/YYYY