AUTO 154 Course Outline as of Spring 2021

CATALOG INFORMATION

Dept and Nbr: AUTO 154 Title: AUTO BRAKES,STEER, SUSPN
Full Title: Automotive Brakes, Steering, and Suspension
Last Reviewed: 2/24/2020

Units		Course Hours per Week		Nbr of Weeks	Course Hours Total	
Maximum	7.00	Lecture Scheduled	5.00	17.5	Lecture Scheduled	87.50
Minimum	7.00	Lab Scheduled	6.50	8	Lab Scheduled	113.75
		Contact DHR	0		Contact DHR	0
		Contact Total	11.50		Contact Total	201.25
		Non-contact DHR	0		Non-contact DHR	0

Total Out of Class Hours: 175.00 Total Student Learning Hours: 376.25

Title 5 Category:	AA Degree Applicable
Grading:	Grade Only
Repeatability:	00 - Two Repeats if Grade was D, F, NC, or NP
Also Listed As:	
Formerly:	AUTO 54

Catalog Description:
Lecture, demonstration, and practical lab experience in the operation, troubleshooting, and repair of the brake, steering, and suspension systems of most late model automobiles. Emphasis on safety and the proper use of tools, machinery, and shop equipment related to those systems. Course prepares students to pass the ASE (Automotive Service Excellence) certification tests; A4-Suspension and Steering and A5-Brakes. Students will be prepared to enter the automotive trade as apprentice level technicians specializing in brake, steering, and suspension repair. This course conforms with National Automotive Technicians Education Foundation (NATEF) instructional guidelines.

Prerequisites/Corequisites:
Course Completion of AUTO 80 OR Course Completion of DET 179 (or DET 80 or DET 60)

Recommended Preparation:
Eligibility for ENGL 100 or ESL 100 or equivalent

Limits on Enrollment:

Schedule of Classes Information:
Description: Lecture, demonstration, and practical lab experience in the operation,

troubleshooting, and repair of the brake, steering, and suspension systems of most late model automobiles. Emphasis on safety and the proper use of tools, machinery, and shop equipment related to those systems. Course prepares students to pass the ASE (Automotive Service Excellence) certification tests; A4-Suspension and Steering and A5-Brakes. Students will be prepared to enter the automotive trade as apprentice level technicians specializing in brake, steering, and suspension repair. This course conforms with National Automotive Technicians Education Foundation (NATEF) instructional guidelines. (Grade Only)
Prerequisites/Corequisites: Course Completion of AUTO 80 OR Course Completion of DET 179 (or DET 80 or DET 60)
Recommended: Eligibility for ENGL 100 or ESL 100 or equivalent
Limits on Enrollment:
Transfer Credit:
Repeatability: Two Repeats if Grade was D, F, NC, or NP

ARTICULATION, MAJOR, and CERTIFICATION INFORMATION:

AS Degree:	**Area**	Effective:	Inactive:
CSU GE:	**Transfer Area**	Effective:	Inactive:
IGETC:	**Transfer Area**	Effective:	Inactive:

CSU Transfer:	Effective:	Inactive:
UC Transfer:	Effective:	Inactive:

CID:

Certificate/Major Applicable:
Both Certificate and Major Applicable

COURSE CONTENT

Student Learning Outcomes:
At the conclusion of this course, the student should be able to:
1. Explain the operation, diagnosis, and repair of modern brake, steering, and suspension systems.
2. Demonstrate safe and proper usage of equipment and machinery used to service modern brake, steering, and suspension systems.
3. Demonstrate the knowledge needed to pass the ASE certification test A4-Suspension and Steering.
4. Demonstrate the knowledge needed to pass the ASE certification test A5-Brakes.

Objectives:
At the conclusion of this course, the student should be able to:
1. Relate applicable physics theories to the operation of brake, steering, and suspension systems.
2. Apply mathematical calculations to diagnose and repair brake, steering, and suspension systems.
3. Interpret a SDS-Safety Data Sheet (formerly MSDS-Material Safety Data Sheet).
4. Explain the basic standards for respiratory safety around asbestos and the requirements for disposal of hazardous asbestos waste.

5. Describe the function of control valves used in automotive brake hydraulic systems.
6. Discuss theory of and methods and equipment for increasing the driver's braking force.
7. Diagnose and perform routine brake hydraulic system service.
8. Differentiate various drum and disc brake designs, discuss pros and cons of those designs.
9. Describe parking brake operation and perform system diagnosis, service, and repair.
10. Use a brake lathe to resurface brake drums and brake rotors.
11. Diagnose tire problems and inspect, repair, and remount tires.
12. Perform wheel balance procedures.
13. Differentiate among types of front and rear suspension systems, discuss their purposes, and describe the suspension system characteristics required on different vehicles. systems and their operations, and perform service procedures.
14. Discuss the construction and operation of steering columns and linkage systems, and conduct diagnostic and replacement procedures.
15. Explain power steering pump design and operation and power steering pump belt construction and replacement.
16. Explain the operation of manual and power recirculating ball steering gears and perform service procedures.
17. Describe the operation and service of a rack and pinion type steering gear, and perform adjustments and other services, including disassembly and reassembly of the units.
18. Diagnose wheel alignment and vehicle tracking problems, and utilize typical computer alignment systems to perform tire alignment.
19. Maintain a safe work environment in an auto shop.

Topics and Scope:

This course conforms with National Automotive Technicians Education Foundation (NATEF) instructional guidelines as of 2014

I. Brake Systems: NATEF Task Area A-5
- A. General Brake Diagnosis
  1. Use of work orders (A5-A-1)
  2. Identify brake concerns (A5-A-2)
  3. Vehicle system information (A5-A-3)
  4. VIN code interpretation (A5-A-4)
- B. Hydraulic System Diagnosis and Repair
  1. Pedal height inspection (A5-B-2)
  2. Master cylinder (A-5-B-3 and 4)
  3. System faults, fluid, and lines (A5-B-5 through 9 and 13)
  4. Valves and warning systems (A5-B-10 and 11)
  5. Hydraulic system bleeding (A5-B-12)
- C. Drum Brake Diagnosis and Repair
  1. Problem diagnosis (A5-C-1)
  2. Drum refinishing (A5-C-2 and 3)
  3. Drum brake service (A5-C-4 through 6)
- D. Disc Brake Diagnosis and Repair
  1. Disc brake diagnosis and service (A5-D-1 through 6)
  2. Disc refinishing (A5-D-7 through 10)
  3. Disc brake wear indicators (A5-D-13)
- E. Power Assist Diagnosis and Repair
  1. Vacuum booster tests (A5-E-1 through 3)
  2. Hydro-Boost test (A5-E-4)
- F. Wheel Bearing, Parking Brake, and Brake Electrical Diagnosis and Repair

1. Bearing diagnosis and service (A5-F-1, 2, 6, and 8)
2. Wheel installation (A5-C-7 and A5-D-12)
3. Parking brake diagnosis and adjustment (A5-D-11, A5-F-3 and 4)
4. Parking brake indicator (A5-F-5)
5. Stop light operation (A5-F-5)

G. Anti-Lock Brake and Traction Control Systems
1. Anti-lock brake system inspection and diagnosis (A5-G-1 through 4)
2. Anti-lock brake system service (A5-G-5 through 7)
3. Traction control system identification (A5-G-9)
4. Regenerative braking system identification (A5-G-10)

II. Suspension, Steering, Alignment: NATEF Task Area A-4

A. General Suspension and Steering System Diagnosis
1. Suspension and steering problem diagnosis (A4-A-2)
2. Suspension and steering system information and specification (A4-A-3)

B. Steering System Diagnosis and Repair
1. Air bag and steering wheel service (A4-B-1 and 2)
2. Steering linkage inspection (A4-B-9 and 18)
3. Power steering fluid service (A4-B-10 through 12 and 16)

C. Suspension System Diagnosis and Repair
1. Diagnose suspension concerns (A4-C-1 and 2)
2. Inspect and replace suspension components (A4-C-3 through 10)

D. Related Suspension and Steering Service
1. Shock absorber replacement (A4-D-1)
2. Electronic suspension diagnosis (A4-D-3)
3. Electronic steering systems (A4-D-4 and 5)
4. Suspension and steering lubrication (A4-D-6)

E. Wheel Alignment Diagnosis, Adjustment, and Repair
1. Pre-alignment inspection (A4-E-1 and 2)
2. 2 and 4 wheel alignment readings and adjustment (A4-E-3)
3. Diagnostic alignment angles (A4-E-4 through 8)

F. Wheel and Tire Diagnosis and Repair
1. Tire and wheel inspection (A4-F-1 through 5 and 9)
2. Tire replacement and repair (A4-F-6 through 8 and 10)
3. Tire pressure monitoring systems (A4-F-11)

III. Appropriate Shop Behavior

A. Safety is stressed in all operations
B. Proper use of tools, machinery, and equipment
C. Working cooperatively with others in groups of 3 or 4 students

All topics covered in the lecture and lab portions of the course.

Assignment:

Lecture-Related Assignments:
1. Reading: approximately 50 pages per week
2. Homework consisting of chapter review questions (optionally graded)
3. Tests and final exam

Lab-Related Assignments:
1. Laboratory exercises that demonstrate the ability to follow industry approved diagnostic and repair procedures in processes such as worksheets, brake assembly, lathe operation and alignment

2. Laboratory work such as: reading and analyzing lab reports, making customer recommendations, and writing diagnostic sheets in a neat, complete, and readable manner
3. Laboratory work including tasks such as: disassemble, inspect, and reassemble components and subsystems

Methods of Evaluation/Basis of Grade:

Writing: Assessment tools that demonstrate writing skills and/or require students to select, organize and explain ideas in writing.

Written diagnostic reports, notebooks, homework (optional)	Writing 0 - 10%

Problem Solving: Assessment tools, other than exams, that demonstrate competence in computational or non-computational problem solving skills.

Laboratory work	Problem solving 5 - 10%

Skill Demonstrations: All skill-based and physical demonstrations used for assessment purposes including skill performance exams.

Laboratory exercises	Skill Demonstrations 30 - 40%

Exams: All forms of formal testing, other than skill performance exams.

Tests and final exam	Exams 35 - 45%

Other: Includes any assessment tools that do not logically fit into the above categories.

Classroom and lab participation	Other Category 5 - 10%

Representative Textbooks and Materials:
Automotive Chassis Systems. 7th ed. Halderman, James. Pearson. 2016
NATEF Correlated Task Sheets for Automotive Technology. 5th ed. Halderman, James. Pearson. 2015 (classic)