

CUYAMACA COLLEGE
COURSE OUTLINE OF RECORD

AUTOMOTIVE TECHNOLOGY 191 – ASSET–BRAKES, ADVANCED BRAKES, SUSPENSION AND NVH

5 hours lecture, 6 hours laboratory, 7 units

Catalog Description

Ford ASSET course to include a detailed study of modern automotive braking systems and service procedures. The course will describe brake systems inspection, adjustments, and repair procedures. Vehicle dynamic electronic brake systems will be demonstrated and described. This course will require the diagnosis and replacement of mechanical and electronic suspension components, and provide training in wheel balancing and tire service. The relationship between brakes and suspension and various causes of noise vibration and harshness will be emphasized. Students will be required to gain practical experience using diagnosing and repairing vehicles. This course is complemented by required work experience at a Ford dealership.

Prerequisite

None

Recommended Preparation

“C” grade or higher or “Pass” in AUTO 122 or AUTO 196 or equivalent

Entrance Skills

Without the following skills, competencies, and knowledge, students entering this course will be highly unlikely to succeed:

- 1) Perform circuit tests using a digital multi-meter (DMM)
- 2) Perform loaded circuit tests
- 3) Perform voltage drop tests
- 4) Diagnose circuits using a wiring diagram
- 5) Navigate the workshop manual
- 6) Use the Ford Integrated Diagnostic System (IDS) to assess codes and parameter identification data (PID)
- 7) Test a battery
- 8) Test a charging system
- 9) Diagnose electronic circuit activations
- 10) Describe electronic components and their functions
- 11) Test a modern vehicle for parasitic electrical drains
- 12) Diagnose network circuits
- 13) Diagnose network codes
- 14) Bench test relays and other electromagnetic solenoids or solid state devices
- 15) Describe transistors
- 16) Describe computer components like random access memory (RAM) and read only memory (ROM)
- 17) Demonstrate knowledge of basic electrical tests
- 18) Demonstrate knowledge of complex electronic tests

Course Content

- 1) Lecture:
 - a. Introduction and safety
 - b. Equipment operation
 - c. Basic hydraulic theory
 - d. Basic laws of physics as related to automotive braking systems
 - e. Drum brake system theory of operation
 - f. Disc brake system theory of operation
 - g. Theory of operation of the various power assist systems
 - h. Theory of operation of electronic anti-lock braking systems
 - i. Suspension theory and design
 - j. Alignment procedures
 - k. Manual steering control systems
 - l. Power steering control systems
 - m. Electronic power steering systems
 - n. Electronic ride control systems
 - o. Tire and wheel design
 - p. Tire balancing principles
 - q. Four wheel steering systems
 - r. Noise vibration and harshness
 - s. Vehicle dynamic systems
- 2) Lab:
 - a. Introduction and safety
 - b. Laboratory procedures
 - c. Equipment operation
 - d. Diagnosing and repairing drum brake systems
 - e. Diagnosing and repairing disc brake systems
 - f. Diagnosing and repairing various power assist systems
 - g. Diagnosing and repairing electronic anti-lock systems
 - h. Pre-alignment checks
 - i. Tire balancing
 - j. Alignment procedures
 - k. Suspension component diagnosis, repair and replacement
 - l. Manual steering system repair and adjustment
 - m. Power steering system repair and adjustment
 - n. Electronic power steering diagnosis and repair
 - o. Electronic ride control diagnosis and repair
 - p. Tire and wheel care
 - q. Alignment of four wheels
 - r. Noise vibration and harshness
 - s. Computer controlled active brakes and suspension systems

Course Objectives

Students will be able to:

- 1) Demonstrate standardized safety and hazardous waste handling practices.
- 2) Apply brake system theory principles in order to diagnose brake system and related problems.
- 3) Perform various brake repairs to prescribed industry standards.
- 4) Perform electronic diagnosis and repair of computer-controlled braking systems to industry standards.
- 5) Relate four wheel alignment and tire balancing theory to practical application.
- 6) Perform suspension and steering system repairs, alignments and tire balancing to prescribed industry standards.
- 7) Perform electronic diagnosis and repair of computer-controlled steering and suspension systems.

- 8) Utilize manufacturer's repair information and technical service bulletins for accurate diagnosis and repair.
- 9) Use Ford NVH tools to perform accurate diagnosis and repair

Method of Evaluation

A grading system will be established by the instructor and implemented uniformly. Grades will be based on demonstrated proficiency in subject matter determined by multiple measurements for evaluation, one of which must be essay exams, skills demonstration or, where appropriate, the symbol system.

- 1) Quizzes, written exams, and hands-on performance exam that measure students' ability to safely identify necessary action or repair, diagnose and perform measurements of brake and suspension system components, and perform necessary tasks related to brake and suspension system repair.
- 2) Practical exercises that measure students' progress toward mastering tasks related to diagnosis, replacement, repair, testing, and adjustment of brake, suspension, NVH and related systems and components.
- 3) Skills-based summative assessment that measures students' ability to successfully complete the necessary NATEF tasks related to diagnosis, replacement, repair, testing, and adjustment of brake and suspension system and components.

Special Materials Required of Student

- 1) Mechanic's hand tool set
- 2) Approved safety glasses
- 3) Specialized brake and alignment tools
- 4) Dealership dress code
- 5) Dealer Sponsorship Agreement Form

Minimum Instructional Facilities

- 1) Auto tech lab (6 bays)
- 2) Smart classroom
- 3) Complete brake servicing equipment center
- 4) Various brake system training models
- 5) Complete four wheel alignment center
- 6) Computer and strobe tire balance equipment
- 7) Specialized alignment and suspension repair tools
- 8) Ford training vehicles
- 9) Ford diagnostic equipment

Method of Instruction

- 1) Lecture and demonstration
- 2) Individual assistance
- 3) Discussion board assignments
- 4) Group assignments
- 5) Formative tests

Out-of-Class Assignments

- 1) Reading assignments
- 2) Writing assignments
- 3) Ford web based training modules
- 4) Tests and quizzes

Texts and References

- 1) Required (representative example): None
- 2) Supplemental: Ford Student Workbook
- 3) Various web based publications

Student Learning Outcomes

Upon successful completion of this course, students will be able to:

- 1) Demonstrate standardized safety and hazardous waste handling practices.
- 2) When given a brake system malfunction, a student will apply brake system theory principles in order to diagnose brake system and related problems using assigned lab sheets for hands-on testing, and successfully repair the problem within 80 -100 % accuracy during the time allotted for the test
- 3) When given a suspension system problem, a student will correct the problem successfully within 80 -100% accuracy during the time allotted for the test.
- 4) A student when given a noise, vibration, or harshness concern will diagnose the concern using the prescribed Ford equipment within 80 – 100% accuracy during the time allotted for the test.