Lecture Contact Hours: 80-90; Homework Hours: 160-180; Total Student Learning Hours: 240-270
Laboratory Contact Hours: 96-108; Homework Hours: 0; Total Student Learning Hours: 96-108

CUYAMACA COLLEGE
COURSE OUTLINE OF RECORD

AUTOMOTIVE TECHNOLOGY 205 – ASEP–ENGINE PERFORMANCE AND AIR CONDITIONING

5 hours lecture, 6 hours laboratory, 7 units

Catalog Description
General Motors ASEP course to include a detailed study of electronic engine controls on modern automobiles. Emphasis is on electronic engine control system theory of operation and repair to include discussion of sensors, processors and actuators, and system diagnosis and repair. On-board computer logic and strategies will be presented. Covers all major topics dealing with automotive air conditioning including refrigeration theory, system evacuation and recovery, leak repair, compressor repair, component replacement, and manual and automatic temperature control. Preparation for ASE and GM certification.

Prerequisite
None

Course Content
1) Lecture:
    a. Introduction and safety
    b. Equipment operation
    c. Basic electronic engine control theory
    d. Solid state electronics
    e. Microprocessors, computers and logic systems
    f. Input devices
    g. Output devices
    h. Review of electronic ignition systems
    i. Electronic spark control systems
    j. Computer-controlled carburetion systems
    k. Computer-controlled fuel injection systems
    l. Refrigeration principles
    m. Moisture removal
    n. Special valves
    o. Manifold gauge sets
    p. Leak detectors
    q. Refrigerant control valves
    r. Air conditioning systems diagnosis
2) Lab:
    a. Introduction and safety
    b. Laboratory procedures
    c. Equipment operation
    d. Diagnosing and repairing ignition systems
    e. Diagnosing and repair fuel systems
    f. Locating and testing carious sensors on vehicles
    g. Locating and testing carious actuators on vehicles
    h. Servicing fuel injection systems
    i. Engine performance maintenance
    j. Air conditioning systems diagnosis

    k. Leak testing
    l. Pressure checks
    m. Compressor repair
    n. Clutch repair
    o. Checking and adding oil
    p. Testing and replacing various regulator valves
    q. Component replacement
    r. Vacuum control

Course Objectives

Students will be able to:

1) Demonstrate standardized safety and hazardous waste handling practices.
2) Relate theory of engine systems to practical diagnostic application.
3) Independently demonstrate ability to perform electronic engine diagnostics using appropriate diagnostic equipment.
4) Independently demonstrate ability to perform computer system and fuel system service using related diagnostic equipment.
5) Apply air conditioning and heating operating theory to diagnose heating and air conditioning systems for proper operation.
6) Diagnose air conditioning and heating systems in need of repair by applying theory of operation principles and prescribed industry standards.
7) Use proper tools and procedures to diagnose air conditioning systems by comparing high and low side gauge readings to ambient temperatures.
8) Utilize proper procedures and test equipment to diagnose and repair electrical components of air conditioning systems.
9) Utilize manufacturer's electronic information system to locate application, test and repair procedures as they apply to air conditioning and electronic engine control systems.

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 measure engine performance and air conditioning related components, and perform necessary tasks related to engine performance and air conditioning repairs.
2) Practical exercises that measure students' progress toward mastering tasks related to diagnosis, replacement, repair, testing, and adjustments of engine performance and air conditioning 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 engine performance and air conditioning systems and components.

Special Materials Required of Student

1) Mechanic's hand tool set
2) Approved safety glasses and goggles
3) Specialized drivability and air conditioning tools

Minimum Instructional Facilities
1) Auto tech lab (6 bays)
2) Complete diagnostic equipment center
3) Complete air conditioning servicing equipment center
4) Various training vehicles
5) Specialized drivability and air conditioning repair tools
6) Smart classroom

Method of Instruction
1) Lecture and demonstration
2) Individual assistance

Out-of-Class Assignments
1) Reading assignments
2) Writing assignments

Texts and References
1) Required (representative example): *Erjacev and Thompson:* Mindtap: Automotive Technology: A Systems Approach. Cengage Unlimited, 2020 ISBN 9780357096772
2) Supplemental: Provided by the General Motors Education Committee electronically

Student Learning Outcomes
Upon successful completion of this course, students will be able to:
1) Recognize an unsafe environmental or safety condition by written or verbal description, and provide resolution instructions with 100% accuracy.
2) Communicate effectively verbally and in writing the symptom to system to component to cause of ~~various~~ customer concerns regarding engine performance systems and components with 100% accuracy.
3) Comply with state and federal emission laws and regulations while performing engine performance diagnosis in a classroom, laboratory, or work environment evaluation with 80% accuracy.
4) Pass a final examination given various engine performance system and component scenarios using multiple measures with 100% accuracy.