Laboratory Contact Hours: 24-27; Homework Hours: 0; Total Student Learning Hours: 24-27

CUYAMACA COLLEGE
COURSE OUTLINE OF RECORD

AUTOMOTIVE TECHNOLOGY 183T – ENGINE PERFORMANCE II INTAKE EXHAUST EMISSION SYSTEMS ASSESSMENT TEST OUT

1.5 hours laboratory, .5 units

Catalog Description
This assessment course includes summative and criterion tests for students to prove knowledge, skills, and abilities to perform diagnosis and repair of engine performance systems on vehicles in the department laboratory, or by using distance education technologies such as augmented reality or virtual reality. The tests will include recorded and live student demonstrations used for observation and assessment. This course allows a student residing at a distance from training centers to complete ASE certification requirements. This course is the assessment for AUTO 183 Engine Performance II Intake Exhaust Emission Systems lecture, AUTO 183L Engine Performance II Intake Exhaust Emission Systems Laboratory, and Work Experience courses.

Prerequisite
None

Recommended Preparation
"C" grade or higher or "Pass" 162T Electronics Diagnosis and Repair Assessment Test Out or the equivalent

Entrance Skills
Without the following skills, competencies, and knowledge, students entering this course will be highly unlikely to succeed:
1. Demonstrate computer input and output tests and activation using a scan tool
2. Obtain and describe normal and abnormal waveforms using a lab-scope
3. Test thermistor, potentiometer, variable reluctance, pressure, Hall-effect and related sensors
4. Graph and interpret system data using PIDS on a scan tool
5. Diagnose and repair computer communication networking faults
6. Describe types and functions of computer memory including RAM, ROM, and PROM
7. Demonstrate proper diagnosis and repair of electronic system concerns

Course Content
1) Lecture:
   a. Introduction and safety
   b. Exhaust gas recirculation
   c. System monitors
   d. Evaporative fuel controls
   e. Heated wide band oxygen sensors (HEGO)
   f. Sensor PID mapping and normal values
   g. Microprocessors, computers, logic systems
   h. Input devices
   i. Output devices
   j. Computer-controlled systems tests
   k. Advanced mapping
   l. Advanced scan tool data manipulations
   m. Catalytic Converters

    n. Emissions systems
    o. Lambda and exhaust gas analysis
    p. Freeze frame data

Course Objectives
Students will be able to:
1) Describe and demonstrate standardized safety and hazardous waste handling practices.
2) Show actual values compared to normal values of engine performance PID data.
3) Demonstrate repair of faults using reference charts, comparing expected values to measured values.
4) Independently perform electronic engine exhaust gas recirculation systems diagnosis.
5) Demonstrate and describe exhaust and catalyst system tests.
6) Perform electronic relative compression tests.
7) Perform power balance tests.
8) Utilize the manufacturer's electronic information system to locate application, test, and repair procedures as they apply to emission systems.
9) Demonstrate and describe various Evaporative Emission Control system testing procedures.
10) Demonstrate, describe, and repair forced air injection system problems.
11) Demonstrate and describe intake manifold systems leak tests.
12) Demonstrate the effect of unmeasured before and after the throttle plate.
13) Describe and demonstrate throttle body testing and repair.
14) Describe and demonstrate the cause and effect of incorrect main load sensor inputs based on sensor priority.
15) Describe and demonstrate system monitors and drive cycles.
16) Describe and test wide band and conventional oxygen sensors.

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, and skills demonstration.
1) Skills-based summative assessment that measures students' ability to successfully complete the necessary tasks related to diagnosis, replacement, repair, testing of automotive engine performance systems.
2) Practical exercises that measure students' progress toward mastering tasks related to diagnosis, replacement, repair, testing of engine performance systems.
3) Student portfolio of competencies record book.
4) Web based training modules.
5) Performance projects.
6) Live and recorded student skills demonstrations will be used for observation.

Special Materials Required of Student
1) Approved safety glasses.
2) High speed internet connection
3) Students will have access to testing tools and equipment while on campus.
4) Safety dress code is required.
5) Computer, tablet, or smart device with large screen.

Minimum Instructional Facilities
1) Auto tech lab (20 service bays)
2) Various training vehicles
3) Smart classroom
4) Diagnostic tools and equipment

Method of Instruction
1) Demonstration
2) Individual assistance
3) Feedback of repair processes regardless of successful or unsuccessful

Out-of-Class Assignments
1) Reading assignments
2) Writing assignments
3) All web based training must be completed prior to "Test Out"
4) Student must pass online pretests prior to laboratory tests
5) Portfolio will be used to display competencies

Texts and References
1) Required (representative examples):
   a. Student workbooks – will be provided electronically.
   b. Required: CDX Master Automotive Technician Series, 2020, **ISBN:** 9781284170917
   c. Web Based Training Modules will be provided electronically.
   d. Workshop Manuals will be provided electronically.
2) Supplemental: None

Exit Skills:
Students who have successfully completed this course exit with the following skills, competencies and/or knowledge:
1) Describe the operation of various engine performance sensors and actuators of intake and exhaust related systems.
2) Use a scan tool to select PIDs and create a map display of engine system related to the operation of air intake and exhaust emissions.
3) Demonstrate knowledge of various intake systems including variable intake, naturally aspirated, and forced air induction.
4) Describe various types of exhaust system components including catalytic converters, exhaust manifolds, secondary air, and the sensors used to monitor oxygen and pressure.
5) Diagnose emission concerns of exhaust gas recirculation, positive crankcase ventilation, intake, air, and evaporative fuel controls.
6) Use system tests to determine normal and abnormal air and exhaust systems operations.
7) Identify incomplete and complete system monitors.
8) Identify freeze frame data.

Student Learning Outcomes
Upon successful completion of this course, students will be able to:
1) Accurately describe and demonstrate repair of various conditions of engine performance emission, exhaust, forced air, and normally aspirated systems.
2) Repair engine performance air fuel ratio system problems by navigating the workshop manual based on symptoms or codes.
3) Communicate effectively and professionally in a diverse setting that includes prospective colleagues, clients, and supervisors.
4) Comply with environmental health and safety regulations at the state and federal levels.