Lecture Contact Hours: 32-36; Homework Hours: 64-72; Total Student Learning Hours: 96-108

CUYAMACA COLLEGE
COURSE OUTLINE OF RECORD

AUTOMOTIVE TECHNOLOGY 111 – ENGINE DIAGNOSIS AND REPAIR

2 hours lecture, 2 units

Catalog Description
This classroom lecture course describes and demonstrates proper operation, disassembly, assembly, repair, and diagnostic techniques for gasoline and diesel engines including the proper timing procedures. The course also includes how to identify and measure critical clearances, and the theory and operation of various combustion engine designs and systems.

Prerequisite
None

Recommended Preparation
"C" grade or higher or "Pass" in Automotive Technology 162T – Electronics Diagnosis and Repair Assessment Test Out

Entrance Skills
Without the following skills, competencies, and knowledge, students entering this course will be highly unlikely to succeed:
1) Describe and test computer inputs
2) Describe and test actuator outputs
3) Describe normal and abnormal sensor waveforms
4) Demonstrate thermistors
5) Test potentiometers
6) Test variable resistors
7) Test various Hall Effect sensors
8) Pressure sensors
9) Test Mass Air Flow
10) Heater elements
11) Capture waveforms using a lab scope
12) Describe computer communication
13) Use scan tool to compare PID values to test values of sensors
14) Create scan tool maps
15) Scan tool component and systems test and activations
16) Describe types and functions of computer memory
17) Clear codes, clear adaptive memory
18) Describe network communication data

Course Content
1) Safety policies and procedures
2) Gasoline and diesel mechanical engine combustion theory and operation
3) Engine timing systems
4) Engine condition tests
5) Ignition spark
6) Fuel injection
7) Exhaust gas recirculation theory
8) Engine component measurements

9) Oil systems
10) Engine temperature control systems
11) Engine vacuum
12) Engine related parameter identification data

Course Objectives

Students will be able to:

1) Identify manufacturer specific repair information for accurate diagnosis and repair
2) Demonstrate knowledge of engine theory and operation by modules and written exams
3) Identify various engine components and repair processes
4) Describe the use of precision measurement tools to identify critical measurements
5) Describe mechanical engine performance tests for failure analysis
6) Describe mechanical tests using scan tool technology as required by the manufacturer
7) Document failure analysis on engine mechanical systems for warranty and customer pay services
8) Communicate a competent knowledge of engine assembly and R&R processes
9) Competently identify engine mechanical concerns for appropriate repairs
10) Identify correct timing of rotating assembly including variable timing

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 proficiently describe the required NATEF tasks related to diagnosis, replacement, repair, testing of automotive engine systems.
2) Practical exercises that measure students' progress toward communication related to diagnosis, replacement, repair, testing of engine systems.
3) A Student portfolio will be used to show student skills.
4) Web based training modules.
5) Performance projects used to evaluate student ability to navigate repair procedures.

Special Materials Required of Student

1) Approved safety glasses.
2) High speed internet connection and access to large screen computer, laptop, or tablet.
3) Students will have access to testing tools and equipment while on campus and by simulations.
4) Uniform dress code is required.

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) Web-based training

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
   d. Workshop Manuals will be provided electronically
2) Supplemental: None

Student Learning Outcomes

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

1) Accurately describe engine system conditions.
2) Correctly identify system solutions for engine problems.
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.