Lassen Community College Course Outline

AT-82 Engine Performance I 3.0 Units

I. Catalog Description

This course was designed to provide the student basic engine performance diagnostic and repair skills. Testing with various meters and shop equipment will be studied. Ignition and fuel system principles and diagnosis will be emphasized. This course meets ASE Education Foundation standards. This course has been approved for Hybrid delivery.

Prerequisite: AT-80 Basic Electrical

Recommended Preparation: Successful completion of ENGL105 or equivalent multiple measures placement.

34 Hours Lecture, 51 Hours Lab, 68 outside-of-class hours, 153 total student learning hours
Scheduled: Fall spring

II. Coding Information

Repeatability: Not Repeatable. Take 1 time
Grading Option: Graded or Pass/No Pass
Credit Type: Credit - Degree Applicable
TOP Code: 094800

III. Course Objectives

A. Course Student Learning Outcomes

Upon completion of this course the student will be able to:

1. Use various meters and test equipment to diagnose, analyze, and repair ignition and fuel injection systems at a beginner.
2. Demonstrate proper use of specialized tools and equipment to diagnose, analyze, and repair ignition and fuel injection systems at a beginner level.

IV. Course Content

A. Safety and shop routine
1. Shop safety and routines
2. Vehicle identifying information, customer concern, related service history, cause, and correction.
3. Identify and interpret fuel and engine control systems concern; determine necessary action.

B. Basic diagnosis techniques
1. Concern, cause, correction
2. Mechanical engine malfunctions
3. Valve adjustment
4. Compression test and engine vacuum testing
5. Leak down test
6. Balance testing
7. Basic ignition testing
8. Fuel pressure testing

9. Cooling system operation

C. Meters and test equipment
1. Digital multimeter
2. High and low amp current probe
3. Lab scope
4. Scanner

D. Ignition System
1. Theory of operation
2. Primary circuit
3. Secondary circuit
4. Spark plugs
5. Distributor type ignition systems
6. DIS type ignition systems
7. Diagnosis

E. Computer Basics
1. Theory of operation
2. Inputs
3. Computing process
4. Output controls

F. Fuel pumps
1. Theory of operation
2. Pressure/volume testing
3. Electric fuel pump control circuits
4. Diagnosis

G. Fuel injection
1. Theory of operation
2. System types
3. Injector control circuits

H. Injector testing and diagnosis
1. Resistance testing
2. Lab scope voltage testing
3. Currant ramping
4. Cleaning and service

I. Turbo and supercharging
1. Volumetric efficiency
2. Turbo and supercharging theory of operation
3. Boost limiters
4. Intercoolers and aftercoolers

V. Assignments

A. Appropriate Readings
1. Industry materials as furnished by the instructor
1. Manufacturer's bulletins
2. Current professional manuals

B. Writing Assignments

Typical writing assignments will include:
1. Providing written answers to assigned questions
2. Performing mathematical calculations as assigned
3. Maintain a notebook of class assignments/activities

4. Maintain a record of completed assignments/activities

C. Expected Outside Assignments

1. Researching appropriate readings
2. Preparing written assignments
3. Studying as needed for successful classroom performance

D. Specific Assignments that Demonstrate Critical Thinking

Students will perform analysis and evaluation of readings and/or classroom materials and utilize this analysis in classroom discussions, writing assignments, and in performing laboratory activities. Students must select and use appropriate methods and materials needed to complete laboratory assignments.

VI. Methods of Evaluation

Traditional Classroom Instruction

Term paper (topic choice, thesis statement, outline, bibliography, rough draft, final draft), homework, classroom discussion, essay, journals, lab demonstrations and activities, multiple choice quizzes, and participation.

Hybrid Evaluation

All quizzes and exams will be administered during the in person class time. Students will be expected to complete online assignments and activities equivalent to in class assignments and activities for the online portion of the course. Electronic communication, both synchronous and asynchronous (chat/forum) will be evaluated for participation and to maintain effective communication between instructor and students.

VII. Methods of Delivery

Check those delivery methods for which, this course has been separately approved by the Curriculum/Academic Standards Committee.

☒ **Traditional Classroom Delivery** ☐ Correspondence Delivery

☒ **Hybrid Delivery** ☐ Online Delivery

Traditional Classroom Delivery:

The appropriate method of instruction will be determined by the instructor and may include:

1. Lecture with or without various audio/visual aids.
2. Group problem solving, discussion, debate, and/or critique.
3. Demonstration
4. Computer-assisted/other self-paced instruction.
5. Field trips for field assignments.
6. Laboratory assignments utilizing planned activities or 'live' work.

Hybrid Delivery:

Hybrid modality may involve face to face instruction mixed with online instruction. A minimum of 1/3 of instruction, including 100% labs, will be provided face to face. The remaining hours will be taught online through a technology platform as adopted by the district.

VIII. Representative Texts and Supplies

Goodnight and VanGelder; *Master Automotive Technician Series Automotive Engine Performance,* 2019, ISBN 9781284102062
Automotive Industry Comprehensive Motor Repair Manuals.
Current professional manuals
Appropriate shop clothing, proper footwear, and safety glasses.

IX. Discipline/s Assignment

Automotive Technology

X. Course Status

Current Status: Active
Original Approval Date: 6/1/1990
Board Approval: 03/12/2013
Chancellors' Approval: 05/01/2013
Revised By: Chad Lewis
Curriculum/Academic Standards Committee Revision Date: 02/15/2022