

Lassen Community College Course Outline

AT-84 Engine Performance II

3.0 Units

I. Catalog Description

This course is designed to provide the student with advanced theory, diagnosis, and repair of various control modules, computer sensors, circuits and emission systems. Extensive use of various meters, lab scopes, and other shop equipment will be used. Vehicle on-board diagnosis systems will be emphasized. This course meets ASE Education Foundation standards and is a California Bureau of Automotive Repair (BAR) ASE alternative course to qualify the student to take the BAR level 2 smog check course. This course has been approved for hybrid and online delivery.

Prerequisite: AT-82 Engine Performance I

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 and 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. Diagnose, analyze, and repair common engine computer control system and sensor malfunctions at a beginner level.
2. Demonstrate proper use specialized tools and equipment in the testing of computer modules, sensors and circuits at a beginner level.

IV. Course Content

A. Safety and shop procedure

1. Shop safety and routines
2. Vehicle identifying information, customer concern, related service history, cause, and correction.
3. Identify and interpret computer control system concern; determine necessary action.

B. Computer and network fundamentals

1. Basic computer functions
2. High side driver
3. Low side driver
4. Digital computer
5. Computer input sensors
6. Computer outputs
7. Module communication and networks

C. Onboard diagnosis

1. OBD history
2. OBDII

3. Monitors
 4. Diagnostic Trouble Codes (DTC)
- D. Computer sensors**
1. Engine Coolant Temperature sensor (ECT) operation and testing
 2. Intake Air Temperature sensor (IAT) operation and testing
 3. Throttle Position Sensor (TPS) operation and testing
 4. Manifold Absolute Pressure (MAP)/Barometric sensor (BARO) operation and testing
 5. Mass Air Flow sensor (MAF) operation and testing
 6. Oxygen sensor (O₂) operation and testing
- E. Scan tool data**
1. Diagnostic procedure
 2. Parameter Identification (PID)
 3. Troubleshooting using DTC
 4. Fuel trim
 5. Service/flash programming
- F. Emission Control Systems Diagnosis and Repair**
1. PCV system inspection and repair
 2. EGR system theory, service, and repair
 3. Secondary air injection and catalytic converter systems diagnostics and repair
 4. Evaporative emissions control system
 5. HC, CO, NO_x, CO₂, and O₂ measurement and diagnosis
- G. Electrical**
1. Wiring diagrams, component locator, power and ground distribution
 2. Battery polarity, shorts, opens, grounds and continuity
 3. Measure volts, amps, and ohms
- V. Assignments**
- A. Appropriate Readings**
1. Assigned Textbooks
 2. Manufacturer's bulletins
 3. Various service manuals
- B. Writing Assignments**
- Typical writing assignments will include:
1. Providing written answers to assigned questions
 2. Performing mathematical calculations as assigned
 3. Maintaining a notebook of class assignments/activities
 4. Maintain a record of completed assignments/activities
- C. Expected Outside Assignments**
- Appropriate out-of-class assignments may include:
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 discussion, 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.

Online Evaluation

A variety of methods will be used, such as: research papers, asynchronous and synchronous (chat/forum) discussions, online quizzes and exams, posting to online website and email communications using the districts approved learning management system.

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 or field assignments.
6. Laboratory assignment 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.

Online Delivery

A variety of methods will be used, such as: research papers, asynchronous and synchronous (chat/forum) discussions, online quizzes and exams, posting to online website and email communications using the districts approved learning management system.

VIII. Representative Texts and Supplies

Goodnight and VanGelder *Master Automotive Technician Series Automotive Engine Performance*, 2019, ISBN 9781284102062

Service Manuals as determined by the instructor. 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