

**DE ANZA COLLEGE**  
**APPLIED TECHNOLOGIES DIVISION**  
Automotive Technology  
**ENGINE PERFORMANCE PROGRAM**

Course Information Sheet

AT 99C                      **Introduction to Engine Performance Systems**

I.        General Information:

Instructor: Pete Vernazza  
Classroom Number: E12F  
Office: (408) 864-8216  
Tool Room: (408) 864-8768  
Email: [vernazzapete@fhda.edu](mailto:vernazzapete@fhda.edu)  
Dates: 01-5-15 through 2-12-15  
Days: Monday through Friday  
Hours: 7:30 AM to 12:20 PM  
Final Examination Date: 2-12-15  
Office hour – 12:30pm to 1:30 pm. Location: E12F  
Winter quarter 2015  
Auto 99C55. CRN 00216

Three Hundred hours lecture-laboratory per quarter

- Operation and principles of various types of ignition systems.
- An in-depth study in the use of test equipment and the oscilloscope.
- Preparation for ASE Test A8
- Fundamentals of onboard computers.
- Testing techniques for system input and output devices.
- Diagnosis, troubleshooting, and repairing the automotive fuel supply system including feedback carburetion.
- Diagnosis, troubleshooting, and repair techniques for no-start conditions.
- Procedure for analyzing and repairing common problems of fuel, ignition, electrical and basic engine mechanical systems which affect engine performance.

Student Learning Outcome - The student will be able to demonstrate the ability to properly install a distributor into an engine, install spark plug wires in the proper firing order and set ignition timing to specifications.

## II. Course Objectives:

The student will:

- A. Identify the components of basic ignition systems.
- B. Test ignition systems including breaker point, Electronic (DI, EI)
- C. Use ignition oscilloscope to analyze ignition waveforms.
- D. Repair and adjust basic ignition systems to manufacturers' specifications.
- E. Demonstrate basic troubleshooting techniques for ignition and fuel systems.

## III. Essential Student Materials

- A. Texts as listed.
- B. Basic tool set and Tune-up tool set.
- C. Approved shop clothing, safety shoes, and safety glasses.

## IV. Essential Facilities

Classroom and automotive technology laboratory.

## V. Expanded Description: Content and Form

- A. Ignition Systems
  1. Conventional breaker point (DI)
  2. Electronic Ignition (DI)
  3. Distributorless Ignition – Waste Spark (EI)
  4. Integrated Distributorless Ignition (Quad 4)
  5. Distributorless Ignition - Coil on plug (COP)
  6. Computer (PCM) controlled ignition
- B. Oscilloscope Types
  1. Analog
  2. Digital
  3. Handheld
- C. Oscilloscope Waveforms – Primary & Secondary
  1. Parade
  2. Raster
  3. Individual Cylinder
  4. Superimposed
  4. Engine Analyzer Functions
- D. Primary Ignition Systems
  1. Breaker Points

2. Ignition Control Module (ICM)
3. Magnetic pulse generators
4. Hall-Effect Sensors
5. Crankshaft Position Sensors (CKP)
6. Camshaft Position Sensors (CMP)

E. Carburetor principles and circuits

1. Atomization
2. Venturi principle
3. Float circuit, idle, and low speed circuit
4. Main metering circuit
5. Power enrichment circuit
6. Accelerator pump circuit
7. Choke circuit

F. Carburetion Repair and Adjustment Procedures

1. Diagnosis, rebuilding, repair & adjustment procedures
2. Mechanical fuel pump diagnosis & testing
3. Idle mixture adjustments
4. Idle speed adjustments
5. Fast idle speed adjustments
6. Choke adjustments
7. Primary vacuum brakes
8. Secondary vacuum brakes

G. Introduction to Computer Controlled Engine Management Systems

1. Feedback carburetor systems and operations
2. Mixture Control Solenoids (MC Solenoid)
3. Idle Speed Control and strategies
4. Sensor Inputs
5. Computer controlled outputs
6. Open Loop Fuel Control
7. Closed Loop Fuel Control

H. Emissions related components and systems

1. Air Injection Systems (AIR)
2. Exhaust Gas Recirculation (EGR)
3. Positive Crankcase Ventilation Systems (PCV)
4. Evaporative Fuel Storage Systems (EVAP)
5. Introduction to 5-gas analysis (HC, CO, CO<sub>2</sub>, O<sub>2</sub> and NO<sub>x</sub>)
6. Catalytic Converters

VI. Assignments

- A. Reading from texts and handouts

- B. Lab assignments per expanded National Automotive Technology Education Foundation (NATEF) task list

#### VII. Methods of Evaluating Objectives

- A. Problem-solving quizzes
- B. Examinations covering major lecture topics
- C. Final examination
- D. Lab assignments per NATEF task list
- E. Performance Final examination

#### VIII. Texts and Supporting References

Texts:

1. Diagnosis and Troubleshooting Automotive Electrical, Electronic, and Computer Systems, 6th Edition. 2012. James Halderman.

#### Classroom and Lab Conduct

- A. Students will be dismissed from class for disruptive behavior per college policy
- B. Students will wear safety glasses, coveralls, and work shoes for the duration of labs.
- C. All required tools must remain available for lab activities. Basic hand tools cannot be checked from the tool room after the first six weeks. Spot checks of tools will be made at random. Students without the required tools will be disqualified from the automotive laboratory.
- D. Students are to remain in assigned areas through clean up.
- E. There is one official 20-minute break between lecture and lab. Additional breaks are at the discretion of the instructor.
- F. It is expected that work will be completed with pride and craftsmanship.

#### Grading System

90% and higher = A  
80% to 89% = B  
70% to 79% = C  
60% to 69% = D  
59% or lower = F

**Per department policy, a minimum grade of “C” is required.  
\*Grades less than “C” in two courses are cause for dismissal from the Day  
Program\***

## Attendance Policy

Just as on the job, regular, punctual attendance is required. Always call or email if you are going to be late or absent. The following limits and conditions apply per department policy:

- a. Students must record attendance on a time card. Punch in prior to 7:30 AM (start of class) and out at 12:20 PM (or at end of class). Punch in neatly and orderly.
- b. For each tardy, there is a 1-hour penalty. 7:30AM is tardy.
- c. Forgetting to punch in or out will constitute a 1-hour penalty.