

I. CATALOG DESCRIPTION:

A. Department Information:

Division: Technical
Department: Automotive
Course ID: AUTO 069
Course Title: Engine Performance - Fuel and Exhaust Systems
Units: 4
Lecture: 3 Hours
Laboratory: 3 Hours
Prerequisite: None

B. Catalog and Schedule Description:

Introduction to emission controls diagnosis and repair, fuel and emission related computerized engine controls, and fuel and exhaust systems. This course along with AUTO 068 will prepare students for ASE A-8 certification test.

II. NUMBER OF TIMES COURSE MAY BE TAKEN FOR CREDIT: One

III. EXPECTED OUTCOMES FOR STUDENTS:

Upon successful completion of the course, the student will be able to:

- A. Identify safety requirements and recognize safety signs and symbols.
- B. Describe the various types of fuel and fuel specification.
- C. Demonstrate the ability to service the components of the various fuel supply systems.
- D. Discuss carburetor fundamentals and service carburetor.
- E. Identify the components and test and service electronic fuel injection systems.
- F. Diagnose and service the exhaust system.
- G. Describe the type of emissions and air pollution caused by vehicles.
- H. Identify the components and operating principles of the positive crankcase ventilation system, evaporative emission control system, exhaust gas recirculation system, air injection system, and the catalytic converter.
- I. Describe the purpose and requirements of an on-board diagnostics generation two system (OBD II).
- J. Diagnose drivability concerns using an exhaust gas analyzer.

IV. COURSE CONTENT:

A. Shop Safety:

- 1. Hazardous materials
- 2. Material Safety Data Sheets
- 3. Machinery hazards

B. Introduction to Fuels:

- 1. Fuel and fuel specification

C. Fuel Supply Systems:

- 1. Fuel supply system components
- 2. Testing and service of fuel supply systems

D. Carburetors:

- 1. Carburetor fundamentals
- 2. Carburetor service

E. Electronic Fuel Injection (EFI) System:

- 1. Introduction to EFI system
- 2. Types of EFI system
- 3. Components of EFI system
- 4. Testing and service of EFI system components
- 5. EFI system performance enhancements
- 6. EFI system drivability

- F. Exhaust Systems:
 - 1. Introduction to exhaust systems
 - 2. Servicing the exhaust system
 - G. Introduction to Emission Controls
 - H. Positive Crankcase Ventilation (PCV) System:
 - 1. The constructions and operations of the PCV system
 - 2. Service the PCV system
 - I. Evaporative Emission Control (EVAP) System:
 - 1. The construction and operation of the EVAP system
 - 2. Service of the EVAP system
 - J. The Exhaust Gas Recirculation (EGR) System:
 - 1. The construction and operation of the EGR system
 - 2. Service of the EGR system
 - K. The Air Injection (AIR) System:
 - 1. The construction and operation of the AIR system
 - 2. Service the AIR system
 - L. The Catalytic Converter:
 - 1. The construction and operation of the catalytic converter
 - 2. Service the catalytic converter
 - M. On-Board Diagnostics Generation Two Monitoring
 - 1. Basic of on-board diagnostics generation two
 - 2. Troubleshooting the on-board diagnostics generation two system
- V. METHODS OF INSTRUCTION:**
- A. Lecture
 - B. Computer assisted instruction and shop manuals
 - C. Class and group discussion
 - D. Manufacturer's video instruction
 - E. Daily lab demonstrations
- VI. TYPICAL ASSIGNMENTS:**
- A. Read assigned chapters and answer questions at the end of each chapter.
Typical Question: When a technician removes the vacuum hose from the fuel pressure regulator on a port injection engine, what should occur?
 - B. Class discussion:
Typical Topic: Difference between OBD I and OBD II computerized systems
 - C. Videotapes:
Typical Assignment: Take notes, outline key points of discussion
 - D. Lab assignments:
Complete task sheets as per NATEF standards
Typical Assignments:
 - 1. Inspect, test, and clean fuel injectors.
 - 2. Adjust idle speed and fuel mixture.
 - 3. Inspect and test components of catalytic converter system; perform necessary action.
- VII. EVALUATION(S):**
- A. Methods of evaluation:
 - 1. Review questions
 - 2. Quizzes (Multiple Choice, Essay, and True/False)
 - 3. Mid-term examination (Multiple Choice)
 - 4. Final examination (Multiple Choice and Essay)
Typical Questions:
 - a) Name three problems that can occur if volatility is too low.
 - b) List and describe the six basic circuits in a carburetor?
 - 5. Assigned lab task as per NATEF standards (A-8 Sections D, E, F)

A-8 Engine Performance

Section D: Fuel, Air Induction, and Exhaust Systems Diagnosis and Repair,
Task 1-17

Typical Task:

Remove, service, and install throttle body; adjust related linkage.

Section E: Emissions Control System Diagnosis and Repair, Task 1-6

Typical Task:

Inspect and test components of intake air temperature control system; perform necessary action.

Section F: Engine Related Service, Task 1-6

Typical Task:

Verify correct camshaft timing; determine necessary action.

B. Frequency of evaluation:

1. One mid-term examination
2. One final examination
3. Weekly quizzes
4. Bi-weekly text book chapter review questions
5. Daily NATEF task assignments (Lab)

VIII. TYPICAL TEXT(S):

Chek-Chart Publications, Engine Performance Diagnosis & Tune -up, 3rd Edition, Columbus, Ohio: Prentice Hall, 1997

Don Knowles, Automotive Engine Performance, 2nd Edition, Albany, New York: Delmar Publishers, 1998

James D. Halderman, Advanced Engine Performance Diagnosis, Upper Saddle River, New Jersey: Prentice Hall, 2002

James E. Duffy, Modern Automotive Technology, Tinley Park, Illinois: Goodheart-Willcox Company, 2000

Instructional Materials Laboratory, Automotive Technology Curriculum, Module 3A 2000 Edition CD ROM, Columbia, Missouri, 2001

IX. OTHER SUPPLIES REQUIRED OF STUDENTS:

Safety equipment, adequate clothing, four 3 1/2" computer disks