

COURSE OUTLINE **Engine Performance II**

Course Description:

AT104. Engine Performance II. 3 hours credit. This course will enable the student to be introduced to the problems encountered within the ignition, evaporative control, and intake air temperature control systems. The operation and control of these systems and their relationship to vehicle emissions are discussed.

Course Relevance:

Through the understanding of the systems explained in this course the student will recognize the need for efficient operation of these systems and their related components in the control of vehicle emissions. Comprehension of these systems and their inter-relationship will allow the student to effectively diagnose and service vehicle drivability and emissions complaints.

Required Materials:

Halderman, J. D., Mitchell (2006) Automotive Engine Performance. Columbus, OH: Prentice Hall

Learning Outcomes: The comprehension of the principles presented as a part of this course will allow the student to diagnose:

1. Vehicle ignition
2. no-start
3. Drivability
4. Emissions complaints

Learning PACT

Through the student involvement in this course, the student will develop and document his/her achievement of the following PACT skills:

Primary skills (developed and documented):

1. Problem Solving
 - Application of the principles learned in this course will allow the student to diagnose ignition and drivability complaints and select the appropriate repair procedure.
2. The Solution
 - Vehicle ignition related drivability problems require that the student know the function and operation of each component and their interrelationship within the system. The solution to these complaints requires that the student utilize an analytical approach to the repair.
3. Speaking

- The student will recognize the need for clear, concise communication with the customer in order to define the complaint. Working in a team environment in the lab encourages the student to further develop their communication skills.
4. Field related technology
- The student will learn to select and utilize the proper diagnostic tool(s) for the task assigned. The student will further develop computer and reading skills in the research of repair procedures, service bulletins and specifications.

Secondary skills (developed but not documented):

Listening
 Reading
 Time management
 Ethical work practices

Assessment Tasks:

These learning outcomes and primary Learning PACT skills will be demonstrated by:

1. The student will identify and describe the function of primary and secondary ignition components
2. The student will identify and describe the function of D.I.S. ignition components
3. The student will test and evaluate ignition modules and pick-up coils
4. The student will test and evaluate secondary ignition coils
5. The student will test and evaluate primary and secondary ignition wiring
6. The student will identify and test evaporative emission control components
7. The student will identify and test intake air temperature control components.

Course Content:

- I. Themes - Key recurring concepts that run throughout this course:
 - A. Ethical work practices
 - B. Time management
 - C. Communication skills
 - D. Safety in the work place
 - E. Cost effectiveness
- II. Issues - Key issues that will be addressed in this course: areas of conflict that must be understood in order to achieve the intended outcome:
 - A. The impact of vehicle ignition and evaporative control systems on emissions.
 - B. Compliance to federal and state regulations governing automotive repair
 - C. The impact of vehicle emissions on global climate
 - D. Fuel mileage issues
 - E. Alternative fuel sources
- III. Concepts – Key concepts that must be understood to address the issues:

- A. Electrical Principles and Laws
 - B. The chemistry of the combustion process
 - C. Proper air/fuel ratios for given driving conditions
 - D. Sources of vehicle emissions
 - E. Ignition timing and delivery systems
- IV. Skills / Competencies - Actions that are essential to achieve the course outcomes:
- A. Diagnose no starting drivability, and emissions problems on vehicles with electronic (D.I.S.) systems; determine needed repairs
 - B. Diagnose no starting, drivability, and emissions problems on vehicles with distributor ignition systems; determine needed repairs.
 - C. Inspect and test distributor; service as needed
 - D. Inspect and test ignition system secondary wiring and components; replace as needed
 - E. Inspect and test ignition system primary wiring, components, and connections; repair as needed.
 - F. Inspect and test ignition coils; replace as needed
 - G. Inspect and adjust (where applicable) ignition timing advance/retard components
 - H. Inspect and test ignition wiring harnesses and connectors; replace as needed
 - I. Inspect and test ignition system pick-up sensors and triggering devices; replace as needed
 - J. Inspect and test ignition control module; replace as needed
 - K. Diagnose emissions and drivability problems resulting from the failure of the intake air temperature control system
 - L. Diagnose emissions and drivability problems resulting from the failure of evaporative emission control systems
 - M. Inspect and test components and hoses of evaporative emissions control systems; replace as needed

Learning Units:

- I. Demonstrate a logical, systematic approach to vehicle emissions and ignition problem resolution
- II. Demonstrate safe, ethical work practices
- III. Demonstrate a working knowledge of ignition and evaporative control systems
- IV. Select and utilize the diagnostic tool(s) appropriate to the assigned task
- V. Demonstrate an understanding of the combustion process through the analysis of exhaust gases

Learning Activities:

Independent and collaborative learning activities will be assigned within the classroom and lab environment to assist the student in achieving the desired outcomes. Class discussion, lecture, reading assignments and supportive lab activities will also contribute to the learning experience.

Grade Determination:

Grade determination will be based on the student's performance of assigned tasks within the classroom/lab environment. Attendance, group participation, and attitude toward fellow students and assigned tasks will be reflected in the final grade. Lab tasks (competencies) will be evaluated (rated) according to the competency profile.