INTRODUCTION

A. This course provides the students with a working knowledge of theory, operation, diagnosis, and repair of basic engine dynamics, ignition systems, and fuel delivery systems. Use of basic engine performance diagnostic equipment. The students will utilize appropriate safety procedures; explain engine dynamics; diagnose and repair ignition systems and fuel delivery systems; and demonstrate the proper use of basic engine performance diagnostic equipment.

B. Engine Performance Analysis I (AUMT 2417) is a required course for the completion of a two year Associate of Applied Science degree in Automotive Mechanic/Technician or a Level I or Level II certificate of completion in the Automotive Technician Program.

C. This course is occupationally related and serves as a preparation for a career in the Automotive Service and Repair field.

D. Prerequisites: This course has a prerequisite of AUMT 1405, 1407, 1472, 2305, and 2437 or consent of the Dept. Chair.

E. Alphanumeric coding used throughout this module book denotes integration of SCANS occupational competencies (C1, etc.) And Foundation skills (F1, etc.).

LEARNING OUTCOMES

Upon successful completion of this course, Engine Performance and Analysis I, the student will:

A. Utilizing the appropriate safety procedures, the student will explain engine dynamics. (C5, 6, 7, 15, 16, 18 thru 20) (F1, 2, 5, 6, 8 thru 10, 12)
B. Describe the operation, diagnosis and repair of different types of ignition and fuel delivery systems. (C5, 6, 7, 15, 16, 18 thru 20) (F1, 2, 5, 6, 8 thru 10, 12)

C. Demonstrate proper use of basic engine performance diagnostic equipment. (C5, 6, 7, 15, 16, 18 thru 20) (F1, 2, 5, 6, 8 thru 10, 12)

D. Use service publications. (C5, 6, 7, 18 thru 20) (F1, 2, 8, 9, 10, 12)

E. Diagnosis, service and repair automotive emission control systems. (C5, 6, 7, 15, 16, 18 thru 20) (F1, 2, 5, 6, 8 thru 10, 12)

F. Describe the different alternative fuel vehicles. (C5, 6, 15, 18 thru 20) (F1, 8 thru 10)

G. Properly and safely use and maintain tools and equipment. (C5, 6, 15, 18 thru 20) (F1, 8 thru 10)

III INSTRUCTIONAL MATERIALS

A. Text: See:  www.ctcd.edu/books

B. Supplemental Reading: As assigned by the instructor.

C. References:  As selected by the instructor.

D. Audio-Visual Aids: (Recommended)

1. “Electronic Fuel Injection” Voc Media Associates
5. “Fuel Systems: Chrysler Port Fuel Injection “ Hygrade AF#5734 (Video)
7. “Fuel Injection, the Basic” Sony (Video)
8. “How to Test Sensors and Controls” Tomco Ti Inc (Video)

E. Other Instructional Materials: As selected by the instructor.

IV COURSE REQUIREMENTS:

A. Your first responsibility is scholarship. The grade you receive will be the result of your efforts both in the classroom and in the laboratory.
B. This course is designed to require a steady, continuous effort from the student. Class participation, initiative, attendance, and work efforts will be considered in grade computation.

C. Reading and study assignments will be made by the instructor. Reading of all study assignments is required, as well as specific tasks outlined by the instructor or listed on handouts, or laboratory activity sheets. Specific reading assignments will be assigned by the instructor. Students are required to complete these assignments by the time specified by the instructor. Quizzes may be given on any or all reading assignments.

D. The study of a subject is not limited to the classroom, laboratory, or limits of the syllabus. Each student should seek out and study all available material available on the subject being taught. This might include use of the Internet or the library. In general, two hours of study outside the regular class period is recommended for each hour of classroom work.

E. Students are required to attend class and laboratory sessions regularly. Those who fail to do so may be dropped from the course with a grade of “FN”.

F. Students are required to be present for all examinations. See paragraph V (Examinations) for additional information.

G. Laboratory learning activities (lab tasks) will be completed on an individual basis except when limited by tools and/or materials.

H. Learning activities will be subjectively graded by the instructor. Students assigned to a group must be present at all times when the project is being worked on. Students who are not present while a learning activity is in progress may be given a “0” for that activity. Students are required to complete all laboratory assignments by the time specified by the instructor.

V  EXAMINATIONS

A. There will be a minimum of three major examinations:

1. Three Week Exam

2. Mid Term Exam

3. Final Exam (this is a comprehensive exam)

4. Additional examinations may be given if the instructor determines it is necessary for proper evaluation of the students in the class.

B. Students must be present for all examinations. Make up examinations will not be
given. Students who know they will be absent on the day of an examination must make arrangements with the instructor prior to the absence. Students who are absent on the day of the examination due to illness or other extenuating circumstances must present to the instructor an acceptable reason for the absence on the day following the absence.

C. Students without an excused absence will be given a zero for that examination.

D. Students must take the final examination to receive a grade for the course.

VI SEMESTER GRADE COMPUTATIONS

A. Written examinations will count 45% of the student’s overall final grade.

B. Practical, hands-on lab work will count 45% of the student’s overall final grade.

C. Incentive points will count 10% of the student’s overall final grade. Incentive points are earned by doing additional work, written assignments, class participation, demonstrated initiative, and positive attitude. Points will be deducted for each unexcused absence, each written assignment not turned in, each tardiness, and each failure to secure tools and clean work areas.

D. Grade Computations (Example):

1. Written Exams (45%) (maximum 100 points)
   1st Exam 90
   2nd Exam 90
   3rd Exam +90
   270 divided by 3 = 90 average

2. Lab score (45%) (maximum 100 points)
   Lab Score = 80
   45% of 80 = 36 points for lab score

3. Incentive Score (10%) (maximum 100 points)
   Incentive Score = 82
   10% of 82 = 8.2 points for Incentive Score

4. Final Overall Grade Computation
   Written Exam 40.5 Points
   Lab Score 36.0 Points
   Incentive Score 8.2 Points
   84.7 Total Points=a letter grade of “B”

E. Points/Score Equivalents:
<table>
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<th>POINTS</th>
<th>GRADE</th>
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VII  NOTES AND ADDITIONAL INSTRUCTIONS FROM THE INSTRUCTOR

A. **Course Withdrawal:** It is the student’s responsibility to officially withdraw from a course if circumstances prevent attendance. Any student who desires to, or must, officially withdraw from a course after the first scheduled class meeting must file a Central Texas College Application for Withdrawal (CTC Form 59). The withdrawal form must be signed by the student.

CTC Form 59 will be accepted at any time prior to Friday of the 12th week of classes during the 16-week fall and spring semesters. The deadline for sessions of other lengths is:

- 10-week session  Friday of the 8th week
- 8-week session  Friday of the 6th week
- 5-week session  Friday of the 4th week

The equivalent date (75% of the semester) will be used for sessions of other lengths. The specific last day to withdraw is published each semester in the Schedule Bulletin.

A student who officially withdraws will be awarded the grade of “W” provided the student’s attendance and academic performance are satisfactory at the time of official withdrawal. Students must file a withdrawal application with the College before they may be considered for withdrawal.

A student may not withdraw from a class for which the instructor has previously issued the student a grade of “F” or “FN” for nonattendance.

B. **Administrative Withdrawal:** An administrative withdrawal may be initiated when the student fails to meet College attendance requirements. The instructor will assign the appropriate grade on CTC Form 59 for submission to the registrar.

C. **Incomplete Grade:** The College catalog states, “An incomplete grade may be given in those cases where the student has completed the majority of the coursework but, because of personal illness, death in the immediate family, or
military orders, the student is unable to complete the requirements for a course. Prior approval from the instructor is required before the grade of “I” for Incomplete is recorded. A student who merely fails to show for the final examination will receive a zero for the final and an “F” for the course.

D. **Cellular Phones and Beepers:** Cellular phones and beepers will be turned off while the student is in the classroom or laboratory.

E. **American’s With Disabilities Act (ADA):** Disability Support Services provide services to students who have appropriate documentation of a disability. Students requiring accommodations for class are responsible for contacting the Office of Disability Support Services (DSS) located on the central campus. This service is available to all students, regardless of location. Explore the website at [www.ctcd.edu/disability-support](http://www.ctcd.edu/disability-support) for further information. Reasonable accommodations will be given in accordance with the federal and state laws through the DSS office.

F. **Instructor Discretion:** The instructor reserves the right of final decision in course requirements.

G. **Civility:** Individuals are expected to be cognizant of what a constructive educational experience is and respectful of those participating in a learning environment. Failure to do so can result in disciplinary action up to and including expulsion.

H. Absence from the class may be unavoidable in some situations. These include illness, military/civilian job requirements, or a death in the immediate family. Documentation is required in the case of excused absences for job requirements, excuses will be on company letterhead stationary signed by the immediate supervisor stating the reason for the absence in for civilian jobs. Excuses for military personnel must be signed by the 1st Sergeant or the Company Commander. In cases of illness, one day absences may be excused on a statement from the individual stating the reason. For more than one day of illness, the individual must have a statement from the doctor treating the illness.
A. **Lesson One:** Introduction to Automotive Fuels and Shop

1. **Learning Outcomes:** Upon successful completion of this lesson the student will:

   a. Identify fuel system components and explain their functions. (C7)(F6)
   b. Practice Shop Safety. (C5,6,15 thru 20) (F1, 8 thru 10)

2. **Learning Activities:**

   a. The student will complete reading assignments as assigned. (F1, F11, C5, C6)
   b. The student will study the words/terms and complete written assignments specified by the instructor. (F1, F11, C5, C6)
   c. The student will attend classroom lectures and participate in classroom discussions. (F5, F6, F7, F9, F10, C1, C5, C6, C7)
   d. The student will observe demonstrations performed by the instructor. (F5, F10, C5, C6, C14)
   e. The student will complete laboratory learning activities assigned by the instructor. See the laboratory learning activity list attached. (F1 thru F17, C1, C3, C5 thru 9, C14 thru 16, C18 thru 20)

3. **Equipment and Materials:**

   a. Examples of various fuels system components for display and demonstration.
   b. Examples of special tools used on different fuel systems. Display and demonstration.
   c. Operating units for use in demonstrations.

4. **Audio-Visual Aids:** (Recommended)

   a. To be selected by the instructor from those listed in Section III D above.
   b. Others as selected by the instructor.

5. **Lesson Outline:**

   a. Introduction
   b. Safety and tools
   c. Automotive Fuels
   d. Fuel Delivery System
B. Lesson Two: Computer Systems

1. **Learning Outcomes:** Upon successful completion of this lesson the student will:

   a. Describe the principle of analog and digital voltage signals, explain the principle of computer communication.(C5 thru 7, 15, 16, 18 thru 20) (F1, 2, 5, 6, 8 thru 10, 12)
   
   b. Explain the basic method by which the CPU is able to make determinations and list and describe the differences in memory types.(C18,19)(f1,6)
   
   c. List and describe the functions of the various inputs by the computer.(C5,15)(F5,6)
   
   d. List and describe the operations of output actuators.(C5,15(F5,6)
   
   e. Explain the requirements to illuminate the MIL in an OBD II system and explain the procedure for self-erasure of DTC’s.(C3,5)(F6,8)
   
   f. Explain how the downstream HO2S sensor monitor the catalytic converter efficiency.(C3,14)(F1,7)

2. **Learning Activities:**

   a. The student will complete reading assignments as assigned. (F1, F11, C5, C6)
   
   b. The student will study the words/terms and complete written assignments specified by the instructor. (F1, F11, C5, C6)
   
   c. The student will attend classroom lectures and participate in classroom discussions. (F5, F6, F7, F9, F10, C1, C5, C6, C7)
   
   d. The student will observe demonstrations performed by the instructor. (F5, F10, C5, C6, C14)
   
   e. The student will complete laboratory learning activities assigned by the instructor. See the laboratory learning activity list attached. (F1 thru F17, C1, C3, C5 thru 9, C14 thru 16, C18 thru 20)

3. **Equipment and Materials:**

   a. Service publications
   
   b. Safety equipment
   
   c. Diagnostic tools and equipment
   
   d. General shop equipment
   
   e. Special tools and equipment
   
   f. Others as selected by the instructor
4. **Audio-Visual Aids:** (Recommended)
   
   a. To be selected by the instructor from those listed in Section III D above.
   b. Others as selected by the instructor.

5. **Lesson Outline:**
   
   a. Introduction
   b. Safety
   c. Introduction to the computer
   d. On Board Diagnostics Second Generation (OBD II)
   e. Engine Operation and the Ignition System

C. **Lesson Three:** Diagnostics

1. **Learning Outcomes:** Upon successful completion of this lesson the student will:
   
   a. Utilizing the appropriate safety procedures, the student will explain the operation, diagnosis, and repair of emission control systems. (C5 thru 7, 15, 16, 18 thru 20) (F1, 2, 5, 6, 8 thru 10, 12)
   b. Describe the operation, diagnosis and repair of computerized engine performance systems and advanced ignition and fuel systems. (C5 thru 7, 15, 16, 18 thru 20) (F1, 2, 5, 6, 8 thru 10, 12)
   c. Demonstrate proper use of advanced engine performance diagnostic equipment. (C5, 6, 7, 15, 16, 18 thru 20) (F1, 2, 5, 6, 8 thru 10, 12)
   d. Use service publications. (C5, 6, 7, 18 thru 20) (F1, 2, 8, 9, 10, 12)
   e. Diagnosis, service and repair automotive related systems that affect performance. (C5, 6, 7, 15, 16, 18 thru 20) (F1, 2, 5, 6, 8 thru 10, 12)
   f. Practice shop safety. (C5, 6, 15, 18 thru 20) (F1, 8 thru 10)
   g. Properly and safely use and maintain tools and equipment. (C5, 6, 15, 18 thru 20) (F1, 8 thru 10)

2. **Learning Activities:**
   
   a. The student will complete reading assignments as assigned. (F1, F11, C5, C6)
   b. The student will study the words/terms and complete written assignments specified by the instructor. (F1, F11, C5, C6)
   c. The student will attend classroom lectures and participate in classroom discussions. (F5, F6, F7, F9, F10, C1, C5, C6, C7)
   d. The student will observe demonstrations performed by the instructor. (F5, F10, C5, C6, C14)
   e. The student will complete laboratory learning activities assigned
by the instructor. See the laboratory learning activity list attached. (F1 thru F17, C1, C3, C5 thru 9, C14 thru 16, C18 thru 20)

3. **Equipment and Materials:**
   
a. TV/VCR (as required)
b. Vehicles with conventional and electronic system
c. General mechanics tool
d. Service publications
e. Safety equipment
f. Diagnostic tools and equipment
g. General shop equipment
h. Special tools and equipment
i. Others as selected by the instructor

4. **Audio-Visual Aids:** (Recommended)
   
a. To be selected by the instructor from those listed in Section III D above.
b. Others as selected by the instructor.

5. **Lesson Outline:**
   
a. Introduction
b. Safety
c. Fuel systems
d. Intake and exhaust systems
e. Emission control systems