I. INTRODUCTION

A. This course provides the student with a working knowledge of automotive computer systems. It includes principle of operation, components and function, tools and test equipment, diagnosis and service and repair of automotive computerized systems.

B. Automotive Computer Systems (AUMT 1472) is a required course for the completion of a two year Associates or Applied Science Degree in Automotive Mechanic/Technician or a Level I or 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 prerequisites of AUMT 1405, 1407, 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.).

II. LEARNING OUTCOMES

Upon successful completion of this course, Automotive Computer Systems, the student will:

A. Identify and explain the function of automotive computer systems. (C7)(F6)
B. Use test equipment. (C18, 19)
C. Demonstrate technical skills by servicing automotive computer systems. (C18, 19)
D. Demonstrate decision making skills by determining correct repair procedures. (F8)
E. Use service publications. (F1, 6) (C7)
F. Explain the theory of operation of automotive computer systems. (C7)(F6)
G. Explain basic electrical and electronic theories. (C7)(F6)
H. Explain the difference between analog and digital voltage signals. (C7)(F6)
I. Explain binary coding as it relates to computer input signals. (C7)(F6)
J. Describe input signal amplification in a computer. (C7)(F6)
K. Explain why an analog/digital (AD) converter is necessary in an automotive computer. (C7)(F6)
L. Describe the purpose of random access memory (RAM). (C7)(F6)
M. Explain the term volatile and nonvolatile memory. (C7)(F6)
N. Describe the purpose of read only memory (ROM). (C7)(F6)
O. Describe the purpose of programmable read only memory (PROM). (C7)(F6)
P. Describe the purpose of keep alive memory (KAM). (C7)(F6)
Q. Define the term adaptive strategy. (C7)(F6)
R. Explain how the computer output drive operates most output sensors. (C7)(F6)
S. Practice shop safety, and properly and safely use and maintain tools and test equipment.

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T. Demonstrate knowledge of and service computer controlled system devices.  (C7, 9, 18, 19, 20)(F6)
U. Demonstrate knowledge of and service computerized body, vehicle theft and passive resistant systems. (C7, 9, 18, 19, 20)(F6)
V. Demonstrate knowledge of and service transmission control systems.  (C7, 9, 18, 19)(F6)

III. INSTRUCTIONAL MATERIALS
A. Instructional materials for this course may be found at www.ctcd.edu/books
B. Supplemental Reading: As assigned by the instructor.
C. Audio-visual aids: See resource list at end of this module book.
D. Other instructional material: as selected by the instructor.

IV. COURSE REQUIREMENTS
A. This course is being taught in a self-paced mode.  It differs from the traditional college course in that you are allowed to work on your own and at your own speed within limitation. This course is 144 clock hours in length. The student may set his/her own schedule within the time frame the course is offered. You must attend class on the days and at the times you selected when you enrolled in the course.

You will have an assigned instructor. If at any time you do not understand a reading assignment, audio visual presentation or lab work, ask your instructor for assistance. He is there for you!

This module book is designed to inform you of the sequence in which this course will be presented. You must follow this sequence and you must do what the module book says. It contains reading assignments, written assignments, audio visual presentations and lab assignments that you must complete or watch. Written assignments will be turned in as directed by the instructor. Late assignments will not be accepted. You must let your instructor know when you are ready to do a learning activity, performance exam or take a scheduled exam.

B. The student must take notes when viewing filmstrips, slides, or videos. Exams may be taken from audio visual aids, reading and lab assignments. If instructor notes or handouts are given to you, you must study them; exams may be taken from these notes also.

C. The instructor may give written assignments or pop quizzes as he deems necessary.

D. Performance Exams:  
   Each student will clean all tools and equipment that they use and properly store them and clean their work area after the completion of each task.

   **Certificate Students:** All lab work will be completed on an individual basis. The student
will receive a pass or fail on the task. Students who fail to complete a task correctly to industry standards must repeat the task. The instructor will date and initial each performance exam task as it is satisfactorily completed. **NOTE: Students who have selected the alpha-numeric grading system will be graded as outlined for degree students (see below).**

**Degree Students:** Laboratory tasks (performance exam) will be completed on an individual basis except when limited by tools and/or materials. **Each performance exam is worth a maximum of 5.3 points.** The maximum lab grade is 100 points. The instructor will deduct points from each lab task score for failure to follow safety precautions and/or a failure to complete the project to industry standards. The instructor will date, initial, and post the points earned for each performance exam as it is completed.

E. The following is part of the course requirements: Each student will assist in lab clean-up at the close of the evening classes and will assist in unloading and storing supply shipments. Failure to do so will result in a failure to complete all course requirements and the student could receive an F or an N for the course.

F. There will be nine (9) written examinations in this course (8 module/unit exams and an exit exam). **Written exams must be completed before taking the performance exam for each module.** The exit exam is a comprehensive exam that covers the entire course. Certificate students must score 70% on the exit exam. Certificate students will be allowed to take the exit exam a maximum of three (3) times. Failure to achieve a 70% score on the exit exam in three (3) tries will result in an "N" for the course and the student must retake the course. **Degree Students should refer to the "grading" section of this outline for guidance.**

G. The student must complete the written assignments to receive a grade. **Written assignments for each unit will be turned into the instructor prior to starting performance exams for that module.** Degree students must complete reading and written assignments at home.

H. If you have special needs because of learning disabilities or other kinds of disabilities, please feel free to discuss this with the instructor. The instructor will attempt to meet your needs with the assistance of counselors, tutors (Project Mainstream), and the assistance of the Disabilities Services Office. Program/course integrity will not be sacrificed. Students must meet all course requirements.
GRADING
Certificate Students: Students will be graded using the standard Skills Center "Pass-Fail" system used for self-paced programs. To satisfactorily complete the written exams, the student must score 80% on tests (except the exit exam, 70%). Students who fail to make the 80% on any exam (except the exit exam) must retake the exam. The current test re-take policy will apply to all certificate students. The student must satisfactorily complete all written and performance exams to receive a passing grade ("P").

Degree Students: Students will be graded using an "alpha-numeric" system as outlined below. Grades made on performance and written exams will be the grade received, including the exit exam. **Students will not be allowed to retake written exams or redo performance exams.**

A. Written exams: Average of written exams will count 40% of the final grade.

B. Completion of written assignments/activities will count 10% of the students’ final grade.

C. Performance Exams (Lab work) will count 50% of the final grade.

D. Grade Computations: (Example)
   Written Exam Scores: (There will be 8 written exams)
   - Exam 1  90
   - Exam 2  80
   - Exam 3  70
   \[
   \frac{240}{3} = 80 \text{ (Average Written Exams)}
   \]

   Written Exam Score Average \(80 \times 40\% = 32\) points
   Written Assignments \(100 \times 10\% = 10\) points
   Performance Exam Score \(80 \times 50\% = 40\) points

   Total = 82 points

   = B

V. NOTES AND ADDITIONAL INSTRUCTIONS FROM THE COURSE 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 an F, an N, an FN, or an XN 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 (an IP) 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 “IP” 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” or ”N” 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 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 for civilian jobs. Excuses for military personnel must be signed by the 1st Sergeant or the Company Commander. NOTE: This does not apply to VA, VA/Voc, or Financial Aid students. There are no excused absences for these students. Talk to your funding agency if you have questions.
Disability Support Services provides 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. Review the website at 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.
VI. FIRST CLASS MEETING

A. The instructor will introduce the course and show the student the textbook.

B. The instructor will verify the class roster/enrollment form:
   1. Call roll
   2. Have each student verify the spelling of his/her name and the social security
      number by initialing the class roster/enrollment form.
      NOTE: When a student’s name does not appear on the degree program class roster,
      they must bring it to the attention of the instructor and must present the instructor
      with CTC Form 29 (Add/Drop Slip) reflecting that he/she has properly registered
      for the course.

C. The instructor will have the student read and sign the course requirements sheet.

D. The instructor will discuss the following topics with the student:
   1. Course requirements, objectives and how the course works
   2. Policy letters
   3. Student handouts
   4. Lab sheet and lab work (Learning activities, Performance exams, competency
      profile)
   5. Exam, grading, reading and written assignments.
   6. Absences
   7. Shop/classroom cleanup tools
   8. Dress code
   9. Parking
   10. Sign-in computer
   11. Course outline/fact sheets/student handouts
   12. Hazardous communications/MSDS information
   13. Shop safety
COURSE OUTLINE OR SEQUENCE

I. Module 1472-01: Introduction to Basic Theories, Computers, and Sensors

A. Time:
Certificate Student: 22 Clock Hours
Degree Student: 2 Weeks

B. Learning Outcomes: Upon completion of this module the student will:

1. Identify and explain the function of automotive computer systems. (C7)(F6)
2. Use test equipment. (C18, 19)
3. Explain the theory of operation of automotive computer systems. (C7)(F6)
4. Explain basic electrical and electronic theories. (C7)(F6)
5. Explain the difference between analog and digital voltage signals. (C7)(F6)
6. Explain binary coding as it relates to computer input signals. (C7)(F6)
7. Describe input signal amplification in a computer. (C7)(F6)
8. Explain why an analog/digital (AD) converter is necessary in an automotive computer. (C7)(F6)
9. Describe the purpose of random access memory (RAM). (C7)(F6)
10. Explain the term volatile and nonvolatile memory. (C7)(F6)
11. Describe the purpose of read only memory (ROM). (C7)(F6)
12. Describe the purpose of programmable read only memory (PROM). (C7)(F6)
13. Describe the purpose of keep alive memory (KAM). (C7)(F6)
14. Define the term adaptive strategy. (C7)(F6)
15. Explain how the computer output drive operates most output sensors. (C7)(F6)
16. Practice shop safety, and properly and safely use and maintain tools and test equipment. (C7, 18, 19, 20)(F6)

C. Read Chapters 1, 2 and 3 in Resource AUMT 1472-01 and answer the review questions at the end of each chapter.

D. See your instructor and ask him or her to explain any part of the reading assignment that you do not understand.

E. Read any handouts that the instructor may have given you that pertain to automotive computer systems and theory.

F. View or Review Audio Visuals: (See your instructor) **Student must take notes**


G. See your instructor and ask him to explain any part of the audio visuals that you do not understand.

H. Ask your instructor to show you the various computer systems designs on vehicles in the shop. Ask him to point out and explain the function of any component that you do not understand.

I. Refer to the Laboratory Learning Activities (Lab Sheet) in this module book and complete the learning activities for this module.

J. Ask your instructor if there is any additional information that you should read or see that pertains to computer systems or operations.

K. Review for Module 1472-01 written exam: Study all previous assignments in this module. See your instructor and ask him to explain any area that you do not understand.

L. Module 1472-01 written exam: (See your instructor)

M. Critique Module 1472-01 written exam: See your instructor.

N. Performance Exam 1472-01: Refer to the Laboratory Learning Activities (Lab Sheet) in this module book and complete the Performance exam for this module. (See your instructor)

O. Degree students must complete this module by the end of the 3rd week. Certificate students should complete this module by the end of the 22 clock hours.
II. Module 1472-02: Computer-Controlled System Device Operations

A. Time:
Certificate Student: 16 Clock Hours
Degree Student: 2 Weeks

. Learning Outcomes: Upon completion of this module the student will:

1. Identify and explain the function of automotive computer systems. (C7)(F6)
2. Use test equipment. (C18, 19)

3. Demonstrate technical skills by servicing automotive computer systems. (C18, 19)
4. Demonstrate decision making skills by determining correct repair procedures. (F8)
5. Use service publications. (F1, 6) (C7)
6. Explain the theory of operation of automotive computer systems. (C7)(F6)
7. Demonstrate knowledge of and service computer controlled system devices. (C7, 9, 18, 19, 20)(F6)
8. Demonstrate knowledge of and service computerized body, vehicle theft and passive resistant systems. (C7, 9, 18, 19, 20)(F6)

C. Read Chapters 4 and 5 and in the Resource AUMT 1472-01 and Resource and answer the review questions at the end of each chapter.

D. See your instructor and ask him or her to explain any part of the reading assignment that you do not understand.

E. View or Review Audio Visuals: (See your instructor) Student must take notes.

1. “Automotive Computer System Operation”, (Shopware), 24744-K (DVD), Resource AUMT 1472-05
2. “Scanning Automotive Computer Problems”, (Shopware), 26253-K, (DVD), Resource AUMT 1472-06

F. See your instructor and ask him to explain any part of the audio visuals that you do not understand.

G. Read any handouts that the instructor may have given you that pertain to computer-controlled system device operations diagnosis and basic adjustments.

H. See your instructor and have him demonstrate the proper use of tools and equipment associated with computer-controlled system device operations.

I. Refer to the Laboratory Learning Activities (Lab Sheet) in this module book and complete the learning activities for this module.
J. Ask your instructor if there is any additional information that you should read or see that pertains to computer-controlled system device operations.

K. Review for Module 1472-02 written exam: Study all previous assignments in this module. See your instructor and ask him to explain any area that you do not understand.

L. Module 1472-02 written exam: (See your instructor)

M. Critique Module 1472-02 written exam: See your instructor

N. Performance Exam 1472-02: Refer to the Laboratory Learning Activities (Lab Sheet) in this module book and complete the Performance exam for this model. (See your instructor)

O. Degree students must complete this module by the end of the 6th week. Certificate students should complete this module by the end of the 38th clock hour.
III. Module 1472-03: Scan Testers, Digital Storage, Oscilloscopes, and Exhaust Gas Analysis

A. Time:
   Certificate Student: 16 Clock Hours
   Degree Student: 2 Weeks

B. Learning Outcomes: Upon completion of this module the student will:

1. Identify and explain the function of automotive computer systems. (C7)(F6)
2. Use test equipment. (C18,19)
3. Demonstrate technical skills by servicing automotive computer systems. (C18, 19)
4. Demonstrate decision making skills by determining correct repair procedures. (F8)
5. Use service publications. (F1, 6)(C7)
6. Explain the theory of operation of automotive computer systems. (C7)(F6)
7. Practice shop safety, and properly and safely use and maintain tools and test equipment. (C7, 18, 19, 20)(F6)

C. Read Chapters 6 and 7 in Resource AUMT 1472-01 and answer the review questions at the end of each chapter.

D. See your instructor and ask him or her to explain any part of the reading assignment that you do not understand.

E. View or Review Audio Visuals: (See your instructor) Student must take notes.


E. See your instructor and ask him to explain any part of the audio visuals that you do not understand.

G. Read any handouts that the instructor may have given you that pertains to scan testers, digital storage oscilloscopes, and on-board diagnostics.

H. See your instructor and have him demonstrate the proper use of scan testers, digital storage oscilloscopes, and on-board diagnostic tools and equipment associated with servicing an automotive computer system.

I. Refer to the Laboratory Learning Activities (Lab Sheet) in this module book and complete the learning activities for this module.

J. Ask your instructor if there is any additional information that you should read or see that pertain automotive computer systems.

K. Review for Module 1472-03 written exam: Study all previous assignments in this module. See your instructor and ask him to explain any area that you do not understand.

L. Module 1472-03 written exam: (See your instructor)
M. Critique Module 1472-03 written exam: See your instructor

N. Performance Exam 1472-03: Refer to the Laboratory Learning Activities (Lab Sheet) in this module book and complete the Performance exam for this module. (See your instructor)

O. Degree students must complete this module by the end of the 8th week. Certificate students should complete this module by the end of the 54th clock hour.
IV. Module 1472-04: OBD II Self-Diagnostics and Multiplexing Concepts

A. Time:
Certificate Student: 16 Clock Hours
Degree Student: 2 Weeks

B. Learning Outcomes: Upon completion of this module the student will:

1. Identify and explain the function of automotive computer systems. (C7)(F6)
2. Use test equipment. (C18, 19)
3. Demonstrate technical skills by servicing automotive computer systems. (C18, 19)
4. Demonstrate decision making skills by determining correct repair procedures. (F8)
5. Use service publications. (F1, 6)(C7)
6. Explain the theory of operation of automotive computer systems. (C7)(F6)
7. Practice shop safety, and properly and safely use and maintain tools and test equipment. (C7, 18, 19, 20)(F6)

C. Read Chapters 8 and 9 in Resource AUMT 1472-01 and answer the review questions at the end of each chapter.

D. See your instructor and ask him or her to explain any part of the reading assignment that you do not understand.

E. View or Review Audio Visuals: (See your instructor) Student must take notes

1. “OBD II Explained”, (Bergwall, DA50) (CD-Rom) AUMT 1472-09

F. See your instructor and ask him to explain any part of the audio visuals that you do not understand.

G. Read any handouts that the instructor may have given you that pertain to testing and evaluating emission control systems and testing with a emissions analyzer.

H. See your instructor and have him demonstrate the proper use of tools and equipment associated with testing and evaluating emission control systems.

I. Refer to the Laboratory Learning Activities (Lab Sheet) in this module book and complete the learning activities for this module.

J. Ask your instructor if there is any additional information that you should read or see that pertains to testing and evaluating emission control systems.

K. Review for Module 1472-04 written exam: Study all previous assignments in this module. See your instructor and ask him to explain any area that you do not understand.

L. Module 1472-04 written exam: (See your instructor)
M. Critique Module 1472-04 written exam: (See your instructor)

N. Performance Exam 1472-04: Refer to the Laboratory Learning Activities (Lab Sheet) in this module book and complete the Performance exam for this module. (See your instructor)

N. Degree students must complete this module by the end of the 11th week. Certificate students should complete this module by the end of the 70th clock hour.
V. Module 1472-05: General Motors’ Electronic Fuel Injection, Port Fuel Injection and Advance Engine Controls

A. Time:
Certificate Student 22 Clock Hours
Degree Student 2Weeks

B. Learning Outcomes: Upon completion of this module the student will:

1. Identify and explain the function of automotive computer systems. (C7)(F6)
2. Use test equipment. (C18, 19)
3. Demonstrate technical skills by servicing automotive computer systems. (C18, 19)
4. Demonstrate decision making skills by determining correct repair procedures. (F8)
5. Use service publications. (F1, 6)(C7)
6. Explain the theory of operation of automotive computer systems. (C7)(F6)
7. Demonstrate knowledge of and service computerized body, vehicle theft, and passive resistant systems. (C7, 9, 18, 19, 20)(F6)
8. Practice shop safety, and properly and safely use and maintain tools and test equipment. (C7, 18, 19, 20)(F6)

C. Read Chapters 10, 11, in Resource AUMT 1472-01 and answer the review questions at the end of each chapter.

D. See your instructor and ask him or her to explain any part of the reading assignment that you do not understand.

E. View or Review Audio Visuals: (See your instructor) Student must take notes

1. "Wire & Cable Training - Body Control Computers” (Motor Standard Product #AF 5895) (Video) Resource AUMT 1472-10
3. “O2 Oxygen Sensor” (GM Expertec) AUMT 1472-14

F. See your instructor and ask him to explain any part of the audio visuals that you do not understand.

G. Read any handouts that the instructor may have given you that pertain to computerized body, vehicle theft, and passive restraint systems.

H. Ask your instructor to show you the various computerized body, vehicle theft, and passive restraint system designs on vehicles in the shop. Ask him to point out and explain the function of any component that you do not understand.

I. See your instructor and have him demonstrate the proper use of tools and equipment associated with computerized body, vehicle theft, and passive restraint systems.

J. Refer to the Laboratory Learning Activities (Lab Sheet) in this module book and complete

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the learning activities for this module.

K. Ask your instructor if there is any additional information that you should read or see that pertains to computerized body, vehicle theft, and passive restraint systems.

L. Review for Module 1472-05 written exam: Study all previous assignments in this module. See your instructor and ask him to explain any area that you do not understand.

M. Module 1472-05 written exam: (See your instructor)

N. Critique Module 1472-05 written exam: (See your instructor)

O. Performance Exam 1472-05: Refer to the Laboratory Learning Activities (Lab Sheet) in this module book and complete the Performance exam for this module. (See your instructor)

P. Degree students must complete this module by the end of the 13th week. Certificate students should complete this module by the end of the 92nd clock hour.

A. Time:
   Certificate Student 16 Clock Hours
   Degree Student 2 Weeks

B. Learning Outcomes: Upon completion of this module the student will:

1. Identify and explain the function of automotive computer systems. (C7)(F6)
2. Use test equipment. (C18, 19)

3. Demonstrate technical skills by servicing automotive computer systems. (C18, 19)
4. Demonstrate decision making skills by determining correct repair procedures. (F8)
5. Use service publications. (F1, 6)(C7)
6. Explain the theory of operation of automotive computer systems. (C7)(F6)
7. Demonstrate knowledge of and service transmission control systems. (C7, 9, 18, 19)(F6)
8. Practice shop safety, and properly and safely use and maintain tools and test equipment. (C7, 18, 19, 20)(F6)

C. Read Chapters 12 and 13 in Resource AUMT 1472-01 and answer the review questions at the end of each chapter.

D. See your instructor and ask him or her to explain any part of the reading assignment that you do not understand.

E. View or Review Audio Visuals: (See your instructor) **Student must take notes**


2. ”Distributorless Ignition” (Ford) Ford Service Training Video Laboratory) (DVD) AUMT 1472-13

F. See your instructor and have him demonstrate the proper use of tools and equipment associated with testing and servicing the electronic automotive transmission control systems. Ask him to clarify any questions you may have about automotive transmissions and the control systems.

G. Refer to the Laboratory Learning Activities (Lab Sheet) in this module book and complete the learning activities for this module.

H. Ask your instructor if there is any additional information that you should read or see that pertains to test procedures an electronic transmission control systems.

I. Review for Module 1472-06 written exam: Study all previous assignments in this module. See your instructor and ask him to explain any area that you do not understand.
J. Module 1472-06 written exam: (See your instructor)

K. Critique Module 1472-06 written exam: See your instructor.

L. Performance Exam 11472-06: Refer to the Laboratory Learning Activities (Lab Sheet) in this module book and complete the Performance exam for this module. (See your instructor)

M. Degree students must complete this module by the end of the 15th week. Certificate students should complete this module by the end of the 108th clock hour.
VII. Module 1472-07: Chrysler Fuel Injection Systems, European (Bosch) Engine Control Systems.

A. Time: 16 Clock Hours
   Certificate Student: 2 Weeks
   Degree Student:

B. Learning Outcomes: Upon completion of this module the student will:

1. Describe the various Chrysler systems and PCMs used with fuel injection, as well as their operating modes. (C6, 7, 8,), (F6)
2. Use test equipment. (18, 19)
3. Define inputs used with a Chrysler fuel injected system. (C7), (F6)
4. Define outputs controlled by a Chrysler fuel injected system. (C7), (F6)
5. Identify the two multiplexing systems used on Chrysler vehicles. (C7) (F6)
6. Define the inputs used with a Motronic fuel injection system. (C7), (F6)
7. Define the outputs controlled by a Motronic fuel injection system. (C7), (F6)
8. Understand the basic diagnostic steps of a Motronic fuel injection system. (C5), (C6), (F7), (F11).

C. Read Chapters 14 and 15 in Resource AUMT 1472-01 and answer the review questions at the end of each chapter

D. See your instructor and ask him or her to explain any part of the reading assignment that you do not understand.

E. Read any handouts that the instructor may have given you that pertain to electronic automotive transmissions and servicing of the control systems.

F. See your instructor and have him demonstrate the proper use of tools and equipment associated with testing and servicing the electronic automotive transmission control systems. Ask him to clarify any questions you may have about automotive transmissions and the control systems.

G. Refer to the Laboratory Learning Activities (Lab Sheet) in this module book and complete the learning activities for this module.

H. Ask your instructor if there is any additional information that you should read or see that pertains to test procedures an electronic transmission control systems.

I. Review for Module 1472-07 written exam: Study all previous assignments in this module. See your instructor and ask him to explain any area that you do not understand.

J. Module 1472-07 written exam: (See your instructor)

K. Critique Module 1472-07 written exam: See your instructor.
L. Performance Exam 11472-07: Refer to the Laboratory Learning Activities (Lab Sheet) in this module book and complete the Performance exam for this module. (See your instructor)

M. Degree students must complete this module by the end of the 15th week. Certificate students should complete this module by the end of the 124th clock hour.

A. Time:
Certificate Student: 16 Clock Hours
Degree Student: 1 Week

B. Learning Outcomes: Upon completion of this module the student will:

1. Describe the sensors and actuators associated with Nissan’s ECCS system. (C6), (C7), (F7), (F8), (F11)
2. Describe the sensors and actuators associated with Toyota’s TCCS system. (C6), (C7), (F7), (F8), (F11)
3. Describe the sensors and actuators associated with Honda’s PGM-FI system. (C6), (C7), (F7), (F8), (F11)
4. Understand the basic diagnostic concepts associated with OBD II diagnosis of these systems. (C18), (F2)
5. Understand the difference between a series-hybrid-drive and a parallel-hybrid-drive vehicle. (C6), (C7), (F2),
6. Define the components and system features of Honda gasoline/electric-hybrid-drive systems. (C6), (C7), (F2),
7. Define the components and system features of Toyota gasoline/electric-hybrid-drive systems. (C6), (C7), (F2),
8. Define the components and system features of Ford gasoline/electric-hybrid-drive systems. (C6), (C7), (F2),
9. Explain the basic principles and understand the advantages associated with a fuel cell vehicle. (C5), (C6), (C7), (C8), (F2)
10. Understand how to narrow down the problem area before beginning pinpoint testing.
11. Define the steps involved in diagnosing an emission test failure.
12. Understand how to use a smoke machine in diagnosing an EVAP system DTC.
13. Identify the important steps in using a flowchart to pinpoint test a DTC or symptom.
14. Understand how to use an electrical schematic in reducing your dependence on a flowchart
15. Define three essential tools of electronic system diagnostics.

C. Read Chapters 16, 17 and 18 in Resource AUMT 1472-01 and answer the review questions at the end of each chapter

D. See your instructor and ask him or her to explain any part of the reading assignment that you do not understand.

E. View or Review Audio Visuals: (See your instructor) Student must take notes

1. “Computers and Cooling Systems”, (Hybrid Auto Repair, Shopware), (DVD, 38768-K), AUMT 1472-15
2. “Hybrid Engines: History and Development”, Hybrid Auto
F. Read any handouts that the instructor may have given you that pertain to electronic automotive transmissions and servicing of the control systems.

G. See your instructor and have him demonstrate the proper use of tools and equipment associated with testing and servicing the electronic automotive transmission control systems. Ask him to clarify any questions you may have about automotive transmissions and the control systems.

H. Refer to the Laboratory Learning Activities (Lab Sheet) in this module book and complete the learning activities for this module.

I. Ask your instructor if there is any additional information that you should read or see that pertains to test procedures an electronic transmission control systems.

J. Review for Module 1472-08 written exam: Study all previous assignments in this module. See your instructor and ask him to explain any area that you do not understand.

K. Module 1472-08 written exam: (See your instructor)

L. Critique Module 1472-08 written exam: See your instructor.

M. Performance Exam 11472-08: Refer to the Laboratory Learning Activities (Lab Sheet) in this module book and complete the Performance exam for this module. (See your instructor)

N. Degree students must complete this module by the end of the 15th week. Certificate students should complete this module by the end of the 140th clock hour.
VIII. Module 1472-09: Exit Exam

A. Time:
   Certificate students 4 Clock Hours
   Degree Students 1 Week

B. Learning Outcomes: Upon completion of this module the student will:
   1. Use basic thinking skills and demonstrate personal qualities and work practices
      used in the work place.
   2. Complete the Exit Exam.

C. Review for Exit Exam: Review all previous assignments.

D. See your instructor and ask him to explain anything that you do not understand about
   automotive computer systems.

E. Module 1472-09 (Exit) Exam: (See your instructor.) Degree students must complete this
   exam by the end of the 16th week. Certificate students must complete their exam by the
   end of the 144th clock hour.

F. Critique Module 1472-09 Written (Exit) Exam: (See your instructor.)

G. There is no performance exam for this module.

H. End of Course Critique and enrollment in the next course in the program. (See your
   instructor.)