I. INTRODUCTION

A. This course provides the student with advanced concepts and skills required for tune-up and troubleshooting procedures of diesel engines. Emphasis on the science of diagnosis with a common sense approach.

B. Diesel Engines I (DEMR 1306) is a required course for the completion of a two year Associate of Applied Science degree in Diesel Engine Mechanic and Repairer or Level I or Level II certificate of completion in the Diesel Technician Program.

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

D. Prerequisites: This course has prerequisites of DEMR 1401 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, Basic Diesel Tune-Up and Troubleshooting, the student will:

A. Describe the history of diesel engines and diesel systems and their evolution. (C7)

B. Demonstrate knowledge of the basic principles of diesel systems and engines and how they function. (C7)

C. Start, run and stop a diesel engine. (C20)

D. Explain the function of diesel engine lubrication systems. (C7)

E. Utilize precision instruments to diagnose and repair basic systems and engines. (C20)

F. Explain the function of diesel engine cooling systems. (C7)

G. Explain the function of diesel engine intake and exhaust systems. (C7)

H. Explain the function of diesel engine retarders and exhaust brakes. (C7)

I. Explain the function of the components of the diesel engine. (C7)

J. Teach others new skills. (C10)
K. Use or prepare budgets, make forecasts, keep records and make adjustments to meet objects. (C2)

L. Use tools and equipment. (C18)

M. Use service publications. (C18)

N. Practice shop safety. (C19)

III. INSTRUCTIONAL MATERIALS

A. Instructional materials for this course can 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 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 128 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, audiovisual 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, audiovisual 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 DVD, CD’s 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.
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.

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 a “N” for the course.

F. There will be seven (7) written examinations in this course (6 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.

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.**

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.
V. **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.**

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

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

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

Grade Computations: (Example)

Written Exam Scores: (There will be 11 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

VI. **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 “N”, or “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 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 “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.
VII. FIRST CLASS MEETING

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

B. The instructor will verify the enrollment form:

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
VIII. COURSE OUTLINE OR SEQUENCE

1. Module 1406-01: Introduction to Diesel Engines

A. Time:
   Certificate Students: 15 Clock hours
   Degree Students: 2 Weeks

B. Module Learning Outcomes: Upon satisfactory completion of this module the student will:
   1. Describe the history of diesel engines and diesel systems and their evolution.
   2. Demonstrate a knowledge of the basic principles of Diesel Systems and Engines and how they function.

C. Read the Fact Sheet 1406-01-01.

D. Read Chapter 4 in Resource DEMR 1406 (Textbook).

E. Read Chapter 5 in Resource DEMR 1406 (Textbook).

F. Read Chapter 6 in Resource DEMR 1406 (Textbook)

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

H. View Audio Visuals: (See your instructor)
   2. View Resource DEMR 1406-02 on the “ABS’s of Diesel Engines.”
   3. View Resource DEMR 1406-03 in “Diesel Engine Operation and Construction.”
   4. View Resource DEMR 1406-04 on “Combustion”

I. See your instructor and ask him if there is any other information that you should view or read that pertains to this module.

J. Complete the Learning Activities listed below for this module.
   1. Complete Worksheet 1406-01-01
   2. Complete Worksheet 1406-01-02
   3. Complete Worksheet 1406-01-03
   4. Complete Worksheet 1406-01-04

K. Review for Module 1406-01 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 1406-01 Written Exam: (See your Instructor)

M. Critique Module 1406-01 Written Exam: (See your instructor)
N. Performance Exam 1406-01: Refer to the Laboratory Learning Activities (Lab Sheet) in this module book and complete the performance exam for this module. (See your instructor).

O. Certificate students should complete this module by the end of the 15th clock hour. Degree students should complete this module by the end of the 2nd week.

II. Module 1406-02: Diesel Engine Components

A. Time:
   Certificate Students: 8 clock hours
   Degree Students: 1 week

B. Module Learning Outcomes: Upon satisfactory completion of this module the student will:
   1. Explain the function of the components of the Diesel Engine. (C7)
   2. Demonstrate knowledge of the basic principles of diesel systems and engines and how they function. (C7)

C. Read Chapter 7 in Resource DEMR 1406 (Textbook).
D. Read Chapter 8 in Resource DEMR 1406 (Textbook).
E. Read Chapter 9 in Resource DEMR 1406 (Textbook).
F. See your instructor and ask him to explain any part of the reading assignment that you do not understand.
G. View Audio-Visuals: (See your Instructor). There are no Audio Visuals for this module.
H. See your instructor and ask him if there is any other information that you should read or view that pertains to this module.
I. Review for Module 1406-02 Written Exam. Study all previous assignments in this module. See your instructor and ask him to explain any area that you do not understand.
J. Module 1406-02 Written Exam: (See your instructor)
K. Critique Module 1406-02 Written Exam. (See your Instructor)
L. Performance Exam Module 1406-02. 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 need of the 3rd week. Certificate students must complete this module by the end of the 23rd clock hour.

III. Module 1406-03: Start, Run, and Stop a Diesel Engine

A. Time:
Certificate Students:  6 clock hours  
Degree Students:        1 week

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

1. Start, run and stop a diesel engine. (C20)
2. Practice Shop Safety. (C19)

C. Read Fact Sheet 1406-03-01 to learn about pre-start inspections.

D. Read Fact Sheet 1406-03-02 to learn about emergency shut-down procedures.

E. Read Fact Sheet 1406-03-03 to learn about diesel starting procedures.

F. Read Fact Sheet 1406-03-04 to learn about starting fluids.

G. See your Instructor and ask him to explain any part of the reading assignment that you do not understand.

H. View Audio Visuals: (See your Instructor)  
There are currently no audio visuals for this module.

I. See your Instructor and ask him if there is any other information that should be viewed or read that pertains to this module.

J. Complete the worksheets listed below for this Module.
   1. Complete Worksheet 1406-03-01
   2. Complete Worksheet 1406-03-02
   3. Complete Worksheet 1406-03-03

K. Review for Module 1406-03 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. Critique Module 1406-03 Written Exam: (See your Instructor)

M. Performance Exam Module 1406-03: 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 4th week. Certificate students must complete this module by the end of the 29th clock hour.

IV. Module 1406-04: Diesel Engine Lubrication Systems

A. Time:  
Certificate Students:  15 Clock Hours  
Degree Students:        3 weeks
B. Module Learning Outcomes: Upon satisfactory completion of this module the student will:

1. Explain the function of diesel engine lubrication systems. (C7)
2. Demonstrate knowledge of the principles of diesel systems and engines and how they function. (C7)
3. Utilize Precision Instruments to diagnose and repair basic systems and engines. (C20)
4. Use tools and equipment. (C18)
5. Use service Publications. (C18)
6. Practice shop safety. (C19)

C. Read Chapter 10 in Resource DEMR 1406 (Textbook).

D. See your Instructor and ask him if there is any other information that should be viewed or read that pertains to this module.

E. View Audio-Visuals (See your Instructor)

F. See your instructor and ask him if there is any other information that should be viewed or read that pertains to this module.

G. Complete the Worksheets listed below for this module.
   1. Complete worksheet 1406-04-01.
   2. Complete worksheet 1406-04-02
   3. Complete worksheet 1406-04-03

H. Review for Module 1406-04 Written Exam. Study all previous assignments in this module. See your Instructor and ask him to explain any area that you do not understand.

I. Module 1406-04 Written Exam: (See your Instructor)

J. Critique Module 1406-04 Written Exam: (See your Instructor)

K. Performance Exam Module 1406-04: Refer to the Laboratory Learning Activities (Lab Sheet) in this module book and complete the Performance Exam for this module. (See your Instructor)

N. Certificate students must complete this module by the end of the 44th clock hour. Degree students must complete this module by the end of the 7th week.

V. Module 1406-05: Diesel Engine Cooling System

A. Time:
   Certificate Students: 20 clock hours
   Degree Students: 3 weeks

B. Module Learning Outcomes: Upon satisfactory completion of this module the student will:
1. Explain the function of diesel engine cooling systems. (C7)
2. Use Precision Instruments to diagnose and repair basic systems and engines. (C7)
3. Use tools and equipment.
4. Use service publications. (C18)
5. Practice shop safety. (C19)

C. Read Chapter 11 in Resource DEMR 1406 (Textbook)

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

E. View Audio-Visuals: (See your instructor)
   1. View Resource 1406-07 on the “Engine Cooling System. (Video)
   2. View Resource 1406-06 on “Solving Cooling System Problems.” (Video)

F. See your instructor and ask him if there is any other information that should be read or viewed that pertains to this module.

G. Complete the Learning Activities listed below for this module.
   1. Complete worksheet 1406-05-01
   2. Complete worksheet 1406-05-02
   3. Complete worksheet 1406-05-03
   4. Complete worksheet 1406-05-04

H. Review for Module 1406-05 Written Exam. Study all previous assignments in this module. See your instructor and ask him to explain any area that you do not understand.

I. Module 1406-05 Written Exam: (See your Instructor)

J. Critique Module 1406-05 Written Exam: (See your Instructor)

K. Performance Exam Module 1406-05: Refer to the Laboratory Learning Activities (Lab Sheet) in this module and complete the Performance Exam for this module. (See your Instructor)

L. Certificate students must complete this module by the end of the 64th clock hour. Degree students must complete this module by the end of the 10th week.

VI. Module 1406-06: Diesel Engine Intake and Exhaust Systems

A. Time:
   Certificate Students: 25 clock hours
   Degree Students: 4 weeks

B. Module Learning Outcomes: Upon satisfactory completion of this module the student will:
   1. Explain the function of diesel engine intake and exhaust systems. (C7)
2. Utilize precision instruments to diagnose and repair basic air intake and exhaust systems. (C20)
3. Use tools and equipment. (C18)
4. Use service publications. (C18)
5. Practice shop safety. (C19)

C. Read Chapter 12 in Resource DEMR 1406. (Textbook)
D. Read Chapter 47 in Resource DEMR 1406 (Textbook)
E. Read Resource DEMR 1406-19
F. Read Fact Sheet 1406-06-01
G. Read Fact Sheet 1406-06-02
H. Read Fact Sheet 1406-06-03
I. See your instructor and ask him to explain any part of the reading assignment that you do not understand.
J. View Audio Visuals: (See your Instructor)
   1. View Resource 1406-08 on “Turbo Charging”
K. See your instructor and ask him if there is any other information that should be viewed or read that pertains to this module.
L. Complete the worksheets listed below for this module.
   1. Complete worksheet 1406-06-01
   2. Complete worksheet 1406-06-02
   3. Complete worksheet 1406-06-03
   4. Complete worksheet 1406-06-04
   5. Complete worksheet 1406-06-05
   6. Complete worksheet 1406-06-06
M. Review for Module 1406-06 written exam: Study all previous assignments in this module. See your instructor and ask him to explain any area that you do not understand.
N. Module 1406-06 written exam: (See your instructor)
O. Critique module 1406-06 written exam: (See your instructor)
P. Performance Exam module 1406-06: Refer to the Laboratory Learning Activities (Lab Sheet) in this module book and complete the Performance Exam for this module (See your instructor).
Q. Certificate students should complete this module by the end of the 89th clock hour. Degree students should complete this module by the end of the 14th week.
VII. Module 1406-07: Diesel Engine Retarders and Exhaust Brakes

A. Time
   Certificate Students: 5 clock hours
   Degree Students: 1 week

B. Module Learning Outcomes: Upon satisfactory completion of this module the student will:
   1. Explain the function of diesel engine retarders and exhaust brakes. (C7)
   2. Teach others new skills. (C10)

C. Read Chapter 13 in Resource 1406 (Textbook)

D. View Audio Visuals: (See your instructor)
   1. View Resource 1406-05 on “C Brake Familiarization”

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

F. Complete the worksheets listed below for this module.
   1. Complete worksheet 1406-07-01
   2. Complete worksheet 1406-07-02

G. Review for Module 1406-07 written exam: Study all previous assignments on this module. See your instructor and ask him to explain any area that you do not understand.

H. Module 1406-07 written exam: (See your instructor)

I. Critique module 1406-07 written exam: (See your instructor)

J. Performance Exam module 1406-07: Refer to the Laboratory Learning Activities (Lab Sheet) in this module book and complete the Performance Exam for this module (See your instructor)

K. Certificate students should complete this module by the end of the 94th clock hour. Degree students should complete this module by the end of the 15th week.

VIII. Module 1406-08: Exit Exam

A. Time
   Certificate Students: 2 clock hours
   Degree Students: 1 week

B. Module Learning Outcomes: Upon completion of this module the student will:
   1. Complete the Exit Exam

C. Review all previous assignments in this module.
D. See your instructor and ask him to explain anything that you do not understand pertaining to this course.

E. Module 1406-08 written (Exit) exam: (See your instructor)

F. Critique module 1406-08 written (Exit) exam (See your instructor)

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

H. Certificate students should complete this module by the end of the 96th clock hour. Degree students should complete this module by the end of the 16th week.