Advanced Diesel Tune-up and Troubleshooting (DEMR 2334)

Credit: 3 semester credit hours (2 hours lecture, 4 hours lab)

Prerequisite: DEMR 1401

Course Description

Advanced concepts and skills required for tune-up and troubleshooting procedures of diesel engines. Emphasis on the science of diagnostics with a common sense approach. This is a capstone course for the Associate of Applied Science degree in Advanced Engine Technology.

Required Textbook and Materials

1. **Diesel Technology** Fundamentals / Service / Repair
   Author: Norman, Corinchock, Scharff
   Publisher: Goodheart and Willcox Company, Inc.
   ISBN # 1-59070-770-2
2. **Diesel Technology Workbook** Fundamentals / Service / Repair
   Author: Norman, Corinchock, Scharff
   Publisher: Goodheart and Willcox Company, Inc
   ISBN # 1-59070-771-0
3. **Glossary of Technical Terms** Fundamentals of Service
   Author: Deere and Company
   ISBN # 0-86691-321-1 ; 2nd edition
4. **In-line 71 Series Service Manual**
   Detroit Diesel Corporation
   Dealer: Stewart and Stevenson Service, Inc.
   Revision May 1994
5. Notebook and 8.5" x 11" notebook paper
6. Blue and Black ink pens
7. Safety glasses and suitable work clothes

Course Objectives

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

1. Analyze engine malfunctions. F1.4, F2.3, F3.3, F5.3, F6.3, F7.4, F8.3, F9.4, F10.3, F11.3, F14.3, F17.4, C1.4, C3.2, C5.3, C7.2, C8.4, C9.4, C10.3, C14.3, C15.4, C18.2, C19.3, C20.4
2. Determine corrective repair. F1.4, F2.3, F3.3, F5.3, F6.3, F7.4, F8.3, F9.4, F10.3, F11.3, F14.3, F17.4, C1.4, C3.2, C5.3, C7.2, C8.4, C9.4, C10.3, C14.3, C15.4, C18.2, C19.3, C20.4
3. Perform engine repairs. F1.4, F2.3, F3.3, F5.3, F6.3, F7.4, F8.3, F9.4, F10.3, F11.3, F14.3, F17.4, C1.4, C3.2, C5.3, C7.2, C8.4, C9.4, C10.3, C14.3, C15.4, C18.2, C19.3, C20.4

Approved 02/2013

4. Adjust engine tune-up according to engine manual. F1.4, F2.3, F3.3, F5.3, F6.3, F7.4, F8.3, F9.4, F10.3, F11.3, F14.3, F17.4, C1.4, C3.2, C5.3, C7.2, C8.4, C9.4, C10.3, C14.3, C15.4, C18.2, C19.3, C20.4
5. Identify basic engine troubleshooting procedures. F1.4, F2.3, F3.3, F5.3, F6.3, F7.4, F8.3, F9.4, F10.3, F11.3, F14.3, F17.4, C1.4, C3.2, C5.3, C7.2, C8.4, C9.4, C10.3, C14.3, C15.4, C18.2, C19.3, C20.4
6. Build employability skills such as attitude, critical thinking, adaptability, and work ethic. F1.4, F2.3, F3.3, F5.3, F6.3, F7.4, F8.3, F9.4, F10.3, F11.3, F14.3, F17.4, C1.4, C3.2, C5.3, C7.2, C8.4, C9.4, C10.3, C14.3, C15.4, C18.2, C19.3, C20.4

SCANS Skills and Competencies

Beginning in the late 1980's, the U.S. Department of Labor **S**ecretary's **C**ommission on **A**chieving **N**ecessary **S**kills (SCANS) conducted extensive research and interviews with business owners, union leaders, supervisors, and laborers in a wide variety of work settings to determine what knowledge workers needed in order to perform well on a job. In 1991, the Commission announced its findings in *What Work Requires in Schools.* In its research, the Commission determined that "workplace know-how" consists of two elements: foundation skills and workplace competencies.

Course Outline

A. Personal and shop safety precautions
   1. General safety rules apply to student conduct
   2. Safety Precaution for each tasks
   3. Use of personal protection equipment
   4. Safety guideline that apply to the starting, testing, and stopping of the diesel engine
B. Service Manual uses and application to diagnostics
   1. Cummins Engines
   2. Detroit Diesels
C. Function of the electronic controls on the diesel engine
   1. Cummins Engines
   2. Detroit Diesels
D. Troubleshooting diesel electronic controls
   1. Detroit Diesels
   2 Cummins Diesels
E. Removal and retiming of fuel injection pumps
   1. Cummins Engines
   2. Detroit Diesels
   3. Deutz engines
F. Circuit devices and symbols used on diesel engines
   1. Cummins Engines
   2. Detroit Diesels
G. Circuit testing equipment and application
   1. Break out box and analyzers
   2. Ohm meter and circuit tester
H. Basic troubling procedures to engine mechanical system
   1. Manual procedures
   2. Electronic procedures
I. Tune-up of varieties of different design engines
   1. Cummins Engines
   2. Detroit Diesels
   3. Caterpillar engines
J. Calculating worksheet for Repairs
   1. Cummins Engines
   2. Detroit Diesels
   3. All- Data program
K. Air Intake Systems
   1. Air Intakes

2. Scavenging and Supercharging
3. Intake Air Cleaners
4. Changing Air Filter Elements
5. Intake Air Silencers
6. Blowers
7. Intake Air Passages

L. Exhaust Systems
1. Exhaust System Purpose
2. Exhaust System Components
3. Exhaust System Services
4. Turbochargers
5. After coolers (Intercoolers)
6. Diesel Exhaust emissions

M. Career Opportunities
1. The Diesel Field
2. ASE Certification
3. Diesel Field
4. Occupational outlook
5. Places of employment

Grade Scale

90 – 100	=	A
80 – 89.9	=	B
70 – 79.9	=	C
60 – 69.9	=	D
0 – 59.9	=	F

Course Evaluation

Final grades will be calculated according to the following criteria:

Daily work, quizzes, lab and homework assignment.	**35%**
Performance Work Grade	**35%**
Outside assignment or class presentation.	**10%**
Final Exam	**20%**
Total	***100%***

Course Requirements

1. Complete specific reading assignments in a timely manner specified by the instructor.
2. Seek out available material on the subject being taught, utilizing the library, periodicals and / or the Internet.
3. Wear sleeved shirts, full length jeans or work pants and preferably leather shoes to class and on campus. No shorts or tank tops are allowed.
4. Participate in project interview or job fair when offered.
5. Complete all work book and class assignments.
6. Be present at class sessions and examinations as scheduled.

Attendance Policy:

1. Missing more than 20% of classes will result in an automatic “F” for the course.
2. Absences are counted for unexcused, excused and coming to class late.
3. Missing more than 20% of a class period will count as an absence.

4. Being tardy 3 times equals 1 absence.

If you wish to drop, you are responsible for the drop process. I will not initiate the drop, no matter how many absences or zeroes you have; that is, if you stop coming to class and do not drop, you will earn an F in the course.

Students are allowed only 6 drops, from any public Institute of higher education, in their lifetime.

Course Policies

1. **No Cell Phone** or **Electronic Devices** allowed in class, unless it is known to the instructor, for a special reasoning.

   All cell phones must be turned off and put away. Text messaging during class time will not be tolerated. Text messaging during an exam will be considered academic dishonesty. The exam will be considered over and the student will receive a zero for the exam.

2. **No** smoking or use of any **tobacco** products allowed.
3. Do not bring any **food** or **drinks** in class.
4. No visitor allowed in class including children
5. **Do not disturb lecture for any reason. If you must leave class or come in late, do so without disturbing class.**
6. **DRESS CODE:**
   Proper work attire only, NO *Open shoes, Short pants, low riding, or sleeveless shirts*, will be allowed in any program classrooms.
7. **No** grades will be **dropped**, No homework or assignments can be made up or accepted after instructor has taken up for grading.
8. **Homework** must be done **in proper outline form, neat and legible**, prepared on **loose leaf (8.5" X 11") note book paper**, written only on **one** side.
9. Assignment must be turn in at the beginning of class.
10. Any student caught cheating will be dropped from class and given an F for the semester grade.
11. Students are required to be present for all examinations and lectures.
12. 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.

NOTE:

Students who violate any of these policies will be asked to leave class and given an absent for the class period. Students who are continuing disturbing classes will be suspended from class for the remainder of the semester and given an grade of F.

Students may vary in their competency levels on these abilities. You can expect to acquire these abilities only if you honor all course policies, attend classes regularly, complete all assigned work in good faith and on time, and meet all other course expectations of you as a student.

Disabilities Statement

The Americans with Disabilities Act of 1992 and Section 504 of the Rehabilitation Act of 1973 are federal anti-discrimination statutes that provide comprehensive civil rights for persons with disabilities. Among other things, these statutes require that all students with documented disabilities be guaranteed a learning environment that provides for reasonable accommodations for their disabilities. If you believe you have a disability requiring an accommodation, please contact the Special Populations Coordinator at (409) 880-1737 or visit the office in Student Services, Cecil Beeson Building.

Course Schedule

Week	Topic	Reference
1	Course introduction and policies • Lecture • Lab: Practice	Handouts
2	Personal and lab Safety orientation • Lecture and class • Lab: Practice and testing	Handouts and equipment
3	Lab project and group assignment • Lecture on assignment and testing • Lab: hand on performance • Project: As Assigned	Detroit diesel engine, 71 tune up L.S.D.W. Service manuals and films
4	Lab project and group assignment • Lecture on assignment and testing • Lab: hand on performance Project: As Assigned	DVD and All-Data usage and Computer program
5/6	Lab project and group assignment • Lecture on assignment and testing • Lab: hand on performance • Project: As Assigned	Cummins Insite program. DVD's and lap top computers
7/8	Lab project and group assignment • Lecture on assignment and testing • Lab: hand on performance • Project: As Assigned	Cummins ISX Tune up and troubleshooting. Service manuals
9/10	Lab project and group assignment • Lecture on assignment and testing • Lab: hand on performance • Project: As Assigned	Cummins ISB and B series 5.9 and 6.7 maintenance and repairs. DVD"s and service manuals

Week	Topic	Reference
11/12	Lab project and group assignment • Lecture on assignment and testing • Lab: hand on performance • Project: As Assigned • Project Interview	60 series Detroit diesel Tune up and maintenance. Service manuals and films
13	Lab project and group assignment • Lecture on assignment • Lab: hand on performance • Project: As Assigned	Deutz diesel engine. Pump Timing and valve settings. Service manuals
14	Lab project and group assignment • Lecture on assignment • Lab: hand on performance Project: As Assigned	92 series V-6 engine tune and diagnostics. Service manuals
15	Lab project and group assignment • Lecture on assignment • Lab: hand on performance • Project: As Assigned	P 48 Natural Gas engine. Handouts and service literature
16	Final Project and Shop organization • Lecture and Review • Final to be announced • End of semester	Review and Handouts

The course schedule is a proposed schedule. Changes in the schedule may be made based upon the instructor's professional judgment. If you are absent on a day in which changes to the schedule have been announced, it is your responsibility to find out those changes.

Contact Information:

Varies by Instructor