



Failure Analysis (DEMR 2348)

Credit: 3 semester credit hours (3 hours lecture)

Prerequisite/Co-requisite: None

Course Description

An advanced course designed for analysis of typical part failures on equipment.

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. Notebook and 8.5" x 11" notebook paper
5. Blue and Black ink pens

Course Objectives

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

1. Identify the type of part failure using visual and special testing equipment. F1.4, F2.4, F3.2, F5.3, F10.2, F11.3, F17.2, C2.3. C8.2
2. Explain nondestructive testing procedures to identify failures. F1.4, F2.4, F3.2, F5.3, F10.2, F11.3, F17.2, C2.3. C8.2
3. Identify wear type and reasons for wear or failure. F1.4, F2.4, F3.2, F5.3, F10.2, F11.3, F17.2, C2.3. C8.2
4. List coolant system major components and functions. F1.4, F2.4, F3.2, F5.3, F10.2, F11.3, F17.2, C2.3. C8.2
5. Describe the service of valves and related components. F1.4, F2.4, F3.2, F5.3, F10.2, F11.3, F17.2, C2.3. C8.2

SCANS Skills and Competencies

Beginning in the late 1980's, the U.S. Department of Labor Secretary's Commission on Achieving Necessary Skills (SCANS) conducted extensive research and interviews with business owners, union leaders, supervisors, and laborers in a wide variety of work

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Course Syllabus

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.) Introduction

1. Introduction of faculty and students
2. Review Syllabus
3. Review Class Policies
4. Reviewing Student Enrollment

B.) Engine Reassembly and Installation

1. Establishing Good Work Habits
2. Inspection and reassembly of Cylinder Block, Sleeves, and Crankshaft Assembly
3. Timing of Inline or Distributor Injection Pumps
4. Cylinder Head Reassembly and Installation
5. Unit Fuel Injectors
6. Rebuilt Engine Run-In Procedures
7. Engine Dynamometer Run-In and Chassis Dynamometer and Operation
8. Engine Installation into Vehicle

C.) Cylinder Heads and Related Components

1. Cylinder Head and Proper Removal
2. Cylinder Head Inspection and Service
3. Valves Inspection, Service, and Identification
4. Valve Guides, Springs, and Seats, Types, Inspection and Service

D.) Camshaft and Valve Train Components

1. Valve Train Operating Mechanisms
2. Inspecting and Servicing the Valve Train
3. Assembling the Valve Train Components

E.) Cooling Systems

1. Types of Cooling Systems, Coolants, Radiator Systems, Surge Tanks, Radiators, and Radiator Fan Shroud
2. Hoses and Radiator Outlets
3. Cleaning and Replacing Cooling System Components
4. Water Manifolds, Water Pumps, and V-Belt Drives
5. Suction Fans and Blower Fans
6. Industrial Engine Cooling Systems
7. Marine Engine Cooling System

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, and homework assignment.	40%
Test over Lecture and Chapters	30%
Outside assignment or class presentation.	10%
<u>Final Exam</u>	<u>20%</u>
<i>Total</i>	<i>100%</i>

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 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 1. Lecture	Handouts
2-4	Engine Reassembly and Installation Establishing Good Work Habits 1. Lecture 2. Test Reassemble and installation	Chapter 28
5-6	Rebuilt Engine Run-In Procedures	Chapter 28

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Course Syllabus

Week	Topic	Reference
	<ol style="list-style-type: none"> 1. Engine Dynamometer Run-In and 2. Chassis Dynamometer and Operation 3. Engine Installation into Vehicle 4. Lecture / Chapter test 	
7-8	Cylinder Heads and Related Components <ol style="list-style-type: none"> 1. Cylinder Head and Proper Removal 2. Cylinder Head Inspection and Service 3. Lecture 	Chapter 8
9-10	Valves Inspection, Service, and Identification <ol style="list-style-type: none"> 1. Valve Guides, Springs, and Seats, Types, Inspection and Service 2. Lecture/ chapter test 3. Test valve inspection 	Chapter 8
10-11	Camshaft and Valve Train Components <ol style="list-style-type: none"> 1. Valve Train Operating Mechanisms 2. Lecture / chapter test 	Chapters 9
12-13	Cooling Systems <ol style="list-style-type: none"> 1. Types of Cooling Systems, Coolants, Radiator Systems, Surge Tanks, Radiators, and Radiator Fan Shroud 2. Lecture 3. Test cooling system 	Chapters 11
14-15	Industrial Engine Cooling Systems <ol style="list-style-type: none"> 1. Marine Engine Cooling System 2. Lecture / chapter test 	Chapter 11
16	Final Project, Review and final Exam <ol style="list-style-type: none"> 1. Lecture 	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 Instructors