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 # 978-1-61960-832-0, 8th edition

2. Diesel Technology Workbook Fundamentals, Service, Repair
   Author: Norman, Corinchock, Scharff
   Publisher: Goodheart and Willcox Company, Inc

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.
2. Explain nondestructive testing procedures to identify failures.
3. Identify wear type and reasons for wear or failure.
4. List coolant system major components and functions.
5. Describe the service of valves and related components.

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

Rev 05/2017
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:

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daily work, quizzes, and homework</td>
<td>40%</td>
</tr>
<tr>
<td>assignment</td>
<td></td>
</tr>
<tr>
<td>Test over Lecture and Chapters</td>
<td>30%</td>
</tr>
<tr>
<td>Outside assignment or class presentation</td>
<td>10%</td>
</tr>
<tr>
<td>Final Exam</td>
<td>20%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

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.
DEM 2348
Course Syllabus

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.

Student Code of Conduct Statement
It is the responsibility of all registered Lamar Institute of Technology students to access, read, understand and abide by all published policies, regulations, and procedures listed in the LIT Catalog and Student Handbook. The LIT Catalog and Student Handbook may be accessed at www.lit.edu or obtained in print upon request at the Student Services Office.

Course Schedule

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
<th>Reference</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Course introduction and policies</td>
<td>Handouts</td>
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<tr>
<td></td>
<td>1. Lecture</td>
<td></td>
</tr>
<tr>
<td>2-4</td>
<td>Engine Reassembly and Installation</td>
<td>Chapter 28</td>
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<tr>
<td></td>
<td>Establishing Good Work Habits</td>
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<tr>
<td></td>
<td>1. Lecture</td>
<td></td>
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<tr>
<td></td>
<td>2. Test Reassemble and installation</td>
<td></td>
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<tr>
<td>5-6</td>
<td>Rebuilt Engine Run-In Procedures</td>
<td>Chapter 28</td>
</tr>
<tr>
<td></td>
<td>1. Engine Dynamometer Run-In and Operation</td>
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<tr>
<td></td>
<td>2. Chassis Dynamometer and Operation</td>
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<td></td>
<td>3. Engine Installation into Vehicle</td>
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<tr>
<td></td>
<td>4. Lecture / Chapter test</td>
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<tr>
<td>7-8</td>
<td>Cylinder Heads and Related Components</td>
<td>Chapter 8</td>
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<tr>
<td></td>
<td>1. Cylinder Head and Proper Removal</td>
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<tr>
<td></td>
<td>2. Cylinder Head Inspection and Service</td>
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</table>
### Course Syllabus

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
<th>Reference</th>
</tr>
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<tbody>
<tr>
<td>3</td>
<td>Lecture</td>
<td></td>
</tr>
<tr>
<td>9-10</td>
<td>Valves Inspection, Service, and Identification</td>
<td>Chapter 8</td>
</tr>
<tr>
<td></td>
<td>1. Valve Guides, Springs, and Seats, Types, Inspection and Service</td>
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<tr>
<td></td>
<td>2. Lecture/ chapter test</td>
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<td></td>
<td>3. Test valve inspection</td>
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<tr>
<td>10-11</td>
<td>Camshaft and Valve Train Components</td>
<td>Chapters 9</td>
</tr>
<tr>
<td></td>
<td>1. Valve Train Operating Mechanisms</td>
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<tr>
<td></td>
<td>2. Lecture / chapter test</td>
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<tr>
<td>12-13</td>
<td>Cooling Systems</td>
<td>Chapters 11</td>
</tr>
<tr>
<td></td>
<td>1. Types of Cooling Systems, Coolants, Radiator Systems, Surge Tanks, Radiators, and Radiator Fan Shroud</td>
<td></td>
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<tr>
<td></td>
<td>2. Lecture</td>
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<tr>
<td></td>
<td>3. Test cooling system</td>
<td></td>
</tr>
<tr>
<td>14-15</td>
<td>Industrial Engine Cooling Systems</td>
<td>Chapter 11</td>
</tr>
<tr>
<td></td>
<td>1. Marine Engine Cooling System</td>
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<tr>
<td></td>
<td>2. Lecture / chapter test</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Final Project, Review and final Exam</td>
<td>Handouts</td>
</tr>
<tr>
<td></td>
<td>1. Lecture</td>
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</tbody>
</table>

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.

REV 5/24/17