Course: Internal Combustion Engines-I

Department of Engineering
Internal Combustion Engines- I EN-2232
Spring 2016

INSTRUCTOR: Lt. Donald Trudeau
Office: Harrington 212A
Phone: ext. 2081
Email: dtrudeau@maritime.edu
Office hours: Monday, Wednesday, Friday 2nd period

TEXT: Handouts
Diesel Engineering Handbook, Karl Stinson

COURSE INFORMATION

DESCRIPTION: This course lays the foundation for future engineering courses. Students will learn the basic principles of construction, operation, maintenance and repair of both 2 stroke and 4 stroke diesel engines of slow, medium and high speed.

This is a required course for **ALL** marine engineering students and contains STCW knowledge and practical elements. The grade of " C- "or better is required.

PREREQUISITE: Algebra/Trig

Learning Objectives

Demonstrate knowledge and understanding of the following STCW elements:
- AB-E-A5.1 Basic knowledge of the function of main propulsion machinery
- AB-E-A5.1 Basic knowledge of the operation of main propulsion machinery
- OICEW-A4.1 Basic construction and operation principles of marine diesel engines
- OICEW-A4.2 Safety and emergency procedures for operation of propulsion plant machinery

Other Objectives
- Correctly start and operate a diesel engine
- Correctly maintain and repair diesel engines.
- Troubleshoot operational problems
- Calculate the indicated horse power
- Identify the engine components and use the correct terminology

GRADING: Quizzes (60%), Class Participation (10%), Labs (10%), Final (20%).

ATTENDANCE: There will be **NO** quiz make-ups. For each *unexcused* absence there will be a 2% deduction from the final course average. Labs are mandatory and any missed labs will result in an **"F"** for the course. **For those that have perfect attendance their lowest quiz grade will be dropped.**

Uniform: **No boiler suits allowed in class**, only uniform of the day. Only long sleeve boiler suits allowed in lab (no short sleeves)

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NOTE: No Programmable Calculators or Cell Phones allowed during classroom or test time.

MMA is committed to providing reasonable accommodations to students with documented disabilities. Students who believe they may need accommodations in this class are required to contact Fran Tishkevich, Director of Disability Compliance, within the first two weeks of class at ext. 2208 or by email ftishkevich@maritime.edu

TOPICS/ASSIGNMENTS	READING
1. Introduction to the Diesel Engine	Handouts, Stinson
2. Cycles of Operation, Timing Diagram	Handouts, Stinson
3. Operating Principles, 2 and 4 Stroke	Handouts, Stinson
4 Efficiencies and Losses	Handouts, Stinson
5 Diesel Power Plants	Handouts, Stinson
6 Construction and Terminology	Handouts, Stinson
7 Cylinder Liners and Heads	Handouts, Stinson
8 Pistons and Crankshafts	Handouts, Stinson
9 Bedplates	Handouts, Stinson
10 Combustion and Emissions	Handouts, Stinson
11 Maintenance and Repairs	Handouts, Stinson
12 Air Supply Systems	Handouts, Stinson
13 Fuel oil, Fuel oil Systems	Handouts, Stinson
14 Fuel Injectors, Injection Systems	Handouts, Stinson
15 Fuel Injection Pumps, Timing and Metering	Handouts, Stinson

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Lab Schedule

Lab 1
Westerbeke 4-107,cylinder head removal and replacement, with emphasis on valves, head construction, valve lash setting.

Lab 2
Detroit 4-53, cylinder head removal and replacement, with emphasis on valves, head construction, valve lash setting.

Lab 3
Group A: Westerbeke: Fuel and fuel injection, fuel purging, injector testing.
Group B: HP fuel pump port and helix metering.
Groups switch at the 2 hour mark to complete the 4 hour lab.

Lab 4
Group A: Detroit: Compression test and tune up.
Group B: Cylinder liner honing, measurements piston measurements.

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Groups switch at the 2 hour mark to complete the 4 hour lab.

Lab 5
Group A: Wartsila parts identification.
Group B: T.S. Kennedy lifeboat engine parts identification, startup and shutdown.
Groups switch at the 2 hour mark to complete the 4 hour lab.

Lab 6
Westerbeke 4-107 or Detroit 4-53: Complete engine tear down on either with liner, piston removal and valve lash setting.

*Note cadets will only do one engine.

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LAB POLICIES

1. You must attend **6, four period labs**, every other week. See Lab schedule for attendance days. **SHOW UP EARLY.**

2. Eye protection MUST be worn. NO ELASTIC BAND goggles.

3. Steel toe shoes MUST be worn.

4. Tools will NOT be stored in the Lab.

5. The student must sign in and have their Lab handout signed before leaving.

6. **Each student is responsible for cleaning** the engine they worked on and any other assignments from the Instructor. The student must not leave the Lab until properly dismissed.

Grading Scale:

A: 95-100	**C+:** 77-79
A-: 90-94	**C:** 73-76
B+: 87-89	**C-:** 70-72
B: 83-86	**F:** > 70
B-: 80-82	

Disclaimer: this syllabus is intended to serve as a guide to the range of topics that will be addressed in EN2232 but the topics and sequence are subject to adjustment or change based on the needs of the class.