

Course: Internal Combustion Engines-I

Department of Engineering
Internal Combustion Engines- I EN-2232
Spring 2025

INSTRUCTOR: LCDR Donald Trudeau
Office: Harrington 216A
Phone: ext. 2081
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Office hours: Monday, Wednesday, Friday 1200 -1300 or scheduled by email

TEXT: Handouts, Pounder's Marine Diesel Engines
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:

Attendance is mandatory for all class lectures and lab instruction. Special liberties **DO NOT COUNT** as an excused absence. Only the Dean can issue an excused absence.

Students with perfect attendance will have their lowest quiz grade dropped.

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There will be NO make-up quizzes offered even with an excused absence and NO QUIZZES WILL BE DROPPED. Missing a quiz equals zero.

Students will be allowed two absences from class lectures only. After that 2 points will be deducted from final grade for each absence. Students will have to make-up all required work. If a student misses more than seven (5) class he or she will fail the class.

Lab instruction classes are **mandatory, if missed, lab must be made up**. An “Incomplete” grade will be issued if all labs are not completed.

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

Bathroom breaks only in extreme emergency

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

ADA Coordinator: Dr. Elaine Craghead, Asst. Dean
ABSIC 320
x5120 (Karen Nahigian)
ADAcompliance@maritime.edu
(We're here 8-4, Monday-Friday)

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

EN-2232 Lab Schedule

Lab 1

Westerbeke or Detroit cylinder head removal and replacement, with emphasis on valves, head construction, valve lash setting.

Lab 2 & 3

Westerbeke 4-107 or Detroit 3-71: Complete engine tear down on either with liner, piston removal and valve lash setting.

Lab 4

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 5

Group A: Detroit: Compression test and tune up.

Group B: Cylinder liner honing, measurements piston measurements.

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

Lab 6

Group A: TS Ranger engine room start up

EN 2232 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:

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A: 94-100

C+: 77-79

A-: 90-93

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.