

Massachusetts Maritime Academy
Internal Combustion Engines II (EN-4131)
Fall 2015

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Office Hours: Mon 1000-1100, Wed and Fri 0800-0900 and by appointment.

TEXTS: "Diesel Engines", Volume I and II (2008)
Author, Kees Kuiken
Target Global Energy Trading ISBN:978-90-79104-02-4

Recommended Text: Marine Engineering Workbook Volumes Two and Three
Preparation for the USCG License Examination

COURSE INFORMATION

DESCRIPTION: Studies diesel engine systems and various methods of application. Engine operation, installation, and maintenance are also considered, The laboratory is divided between shipboard systems and the diesel laboratory ashore. [Lab time required]
This is the second of a two course Internal Combustion Engine sequence In ICE I Students learned 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 course builds on the knowledge obtained in ICE I by investigating complete systems and their applications. Particular emphasis will be placed on Lubrication, Cooling, Starting, Governing, Waste Heat, Gearing, and Purification Systems.

This is a required course for all Marine Engineering students and contains STCW knowledge and practical elements. A grade of " C- " or better is required.

PREREQUISITE: ICE I (EN-2232)

Learning Outcomes - At the successful completion of the course, the student will fulfill the following STCW requirements:

Demonstrate knowledge and understanding of the following STCW elements:

OICEW-A4.2: Safety and emergency procedures for operation of propulsion plant control systems

OICEW-A4.3 Preparation, operation, fault detection and measures to prevent damage for main engine and associated auxiliaries

OICEW-B1.2 Main propulsion plant operational control systems

Demonstrate proficiency in the following skills:

- OICEW-5-1J Prepare main propulsion diesel engine for operation
- OICEW-5-1K Secure main propulsion diesel engine
- OICEW-7-1A Start emergency generator
- OICEW-7-1B Pre-start inspection of diesel generator

Other Objectives

- Correctly start and operate a diesel engine
- Correctly maintain and repair diesel engines.
- Troubleshoot operational problems
- Be able to pass the USCG license exam for third assistant engineer, motor section.

GRADING:	Quizzes (3-4)	25%
	Tests (3)	45%
	Homework	30%

Final Exam: The final exam will consist of 100 USCG questions. The ENTIRE motor question database is fair game! Topics from Diesels I and Diesels II will be included.

Attendance: It is expected students will come to class on time and not leave early. Late arrivals and early departures are distracting to the class. You must be present for all tests and labs. There will be **NO** quiz make-ups. Unexcused absences will be assigned a grade of zero for the missed work.

Let me know **in advance** by email or in person if you must miss a class or lab. Labs are mandatory. **Everyone will take the final. For each unexcused absence there will be a 2% deduction from the final course average. The student must let the instructor know about expected absences by email.**

•LABS: Lab participation is critical. There are 6 different Labs required. All Labs must be completed during that particular labs two week cycle. **THERE WILL BE NO MAKEUP LABS!**
A missed Lab will result in a grade of F for the course.

Homework: Weekly homework will be assigned and will be based solely on material covered in class. Homework should be neat and the pages stapled together. A ruler or "straight edge" should be used for any sketches. *Unit labels must be carried out throughout the problem or no credit will be given for that problem.* Check all math and dimensions. Box and label answers. Every page should contain your name, the course number and the assigned due date. All homework will be due in class on the following class unless stated otherwise. Late homework will not be accepted.

Study tips: Exams, quizzes and homework will focus exclusively on material covered in class. Attendance is mandatory for this reason! If you follow along in class and complete all homework, there will be no surprises.

Disclaimer: This syllabus is intended to serve as a guide to the range of topics that will be addressed in EN4131 but the topics and sequence are subject to adjustment or change based on the needs of the class..

Electronics: Cell phones must be silenced and remain out of sight. Laptop note taking will not be necessary nor allowed. Therefore, Laptops or any Ipad type devices will not be allowed in class. Violations may be subject to grade deductions of up to 1% of the final grade per violation.

TOPICS

READING

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| 1. Lube Oil and Lube Oil Systems | Volume 1 Chapter 11 & Handouts |
| 2. Engine Coolants and Cooling Systems | Volume I Chapter 10 & Handouts |
| 3. Air Intake Systems | Volume I Chapter 12 & Handouts |
| 4. Supercharging and Exhaust Systems | Handouts |
| 5. Waste Heat Recovery and Auxiliary Boilers | Handouts |
| 6. Stating Reversing and Drive Trains | Volume I Ch 13 &14 & Handouts |
| 7. Governors and Engine Speed Control | Volume I Chapter 15 & Handouts |
| 8. Engine Emissions and Control | Volume II Chapter 22 & Handouts |
| 9. Operation & Troubleshooting | Handouts |

Reference Website: <http://www.marinediesels.info/index.html>

This is a fantastic website dedicated to marine diesels of all types. If you're serious about learning about marine diesels then you need to spend time on this site!

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

Successful completion of this course also includes STCW practical assessments using the Westerbeke diesel engine. The assessments will take place late in the semester and are described on the following page.

STCW 1/C Assessments

1. Properly start the Westerbeke four stroke cycle engine:
 - a. Be able to properly name and describe each component in the fuel system.
 - b. Be able to purge (bleed) air from the fuel injection system.
 - c. Be able to check all liquid levels.
 - d. Be able to hook up the starting system
 - e. Be able to start the engine and check appropriate gages upon starting.

2. Valve Lash setting:
 - a. Be able to explain the necessity of setting valve lash and be able to explain the consequences of excessive or inadequate valve to rocker arm clearance.
 - b. Be able to locate TDC on the start of the power stroke for all valves.
 - c. Be able to set the lash to the correct clearance. Be able to explain the reason for the different clearances for some engines from intake to Exhaust valve settings.