Department of Marine Engineering

Steam Generators / EN-3131

Fall 2015

Instructor: Lt. Donald E. Trudeau
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Office Hours: Third Period on Monday, Wednesday, and Friday

Prerequisite: Calculus II (SM-2113)

Recommended Texts:
Modern Marine Engineer's Manual, Vol. 1 (Osbourne or Hunt)
Engineering Training Manual TS Kennedy (Haynes)
Marine Engineering Workbooks, Vol. 1, 2, 3 (Haynes) 6th Ed.
Handouts will be distributed during class lectures and lab instruction

CELL PHONES ARE TO BE OFF AND PUT AWAY!

Course Description: To prepare the student in understanding the design, construction, and operation of marine boilers.

Attendance:

- Attendance is mandatory for all class lectures and lab instruction. Special liberties DO NOT COUNT as excused.
- Students with perfect attendance will have their lowest quiz grade dropped. 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 excused absences from class lectures only provided they provide notification twenty-four hours before the scheduled class. Students will have to make-up all required work.
- For each unexcused lecture absence, the final grade will be reduced by 2 percent.
- Lab instruction classes are **mandatory**. Disciplinary action will be taken if needed. An "Incomplete" grade will be issued if all labs are not completed.

Grading:

- Quizzes 60%
- Class Participation 10%
- Final Examination 20%
- Labs 10%

Note: ***This is a STCW required course, the only grades earned in this class will be "A, B, C or F", there will be no "D".***

TOPICS

Reading Assignments: Will be given out and amended as needed.

1. Introduction to Course – Basic Concepts: Btu's, pressure, temperatures, etc.
2. Properties of Steam – Superheated and saturated steam, latent heat, quality of steam, etc.
3. Boiler Capacity Limitations – Circulation, carryover, combustion rate, heat transfer
4. Boiler Classification, Fire Tube Boilers, Water Tube Boilers
5. Design and Construction of Boilers
6. Boiler Refractories
7. Internal Boiler Fittings
8. Superheaters and Desuperheaters
9. Heat Recovery Devices
10. Boiler Water Chemistry
11. External Boiler Fittings
12. Feedwater Regulators
13. Combustion – Atomizers, Registers, Fuel Oil, Fuel Oil Systems
14. Combustion – Chemistry of Combustion, Stack Gas Analysis
15. Boiler Operation and Controls

All of the above material may be amended or rearranged depending on subject emphasis and/or student needs.

Student Learning Outcomes: The main objective of the course is to give the student an understanding of the design, construction, and operation of marine boilers.

Learning Objectives

Demonstrate knowledge and understanding of the following STCW elements:

- OICEW-A4.1 Basic construction and operation principles of marine boilers
- OICEW-A4.3 Preparation, operation, fault detection and measures to prevent damage for steam boiler and associated auxiliaries
- OICEW-A4.3 Preparation, operation, fault detection and measures to prevent damage for steam systems
- OICEW-B1.2 Steam boiler automatic controls
- RFPEW-A2.1 Safe operation of boilers

Demonstrate proficiency in the following skills:

- OICEW-5-2D Boiler water test

Other Objectives

- Locate and identify all components relating to the training ship's boilers
- Light off the fire tube boiler in the boiler lab.
- Understand the design, construction, and operation of marine boilers.
- Understand basic thermodynamics and steam tables
- Understand how to perform fundamental engineering calculations
- Understand both fire tube and water tube boiler fundamentals and operation
- Understand boiler refractories
- Understand internal boiler fittings
- Understand superheaters and desuperheaters
- Understand heat recovery devices
- Understand external boiler fittings
- Understand combustion theory
- Understand boiler water chemistry and treatment
- Understand boiler operation

The laboratory consists of locating and identifying all components relating to the training ship's boiler and steam systems. Light off the fire tube boiler in the boiler lab. Conduct boiler water tests.

Uniform and Dress Code:

Cadets are expected to be in proper uniform of the day as announced by the Commandant of Cadets. NO BOILER SUITS ARE ALLOWED IN THE CLASSROOM, YOU WILL BE ASKED TO LEAVE THE CLASS AND MARKED ABSENT IF YOU WEAR A BOILER SUIT TO CLASS.

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