

**DEPARTMENT OF MARINE ENGINEERING
STEAM GENERATORS / EN-3131
FALL 2012**

INSTRUCTOR: CDR ALDRICH

- TEXTS:**
1. Introduction to Marine Engineering (Latham)
 2. Marine Engineering Workbook, Vol. II
 3. Modern Marine Engineers Manual (M.M.M.), Vol. 1 (Osbourne)

COURSE DESCRIPTION:

Covers the design, construction, and operation of steam generators (boilers). It also considers fuel and their combustion, combustion equipment, combustion control, feedwater regulators, air heaters, economizers, superheaters, reheaters, boiler water treatment, and auxiliary boilers. A laboratory aboard the Academy's training ship is included, emphasizing boiler external fittings, safety valves, fuel oil systems and main and auxiliary steam systems.

LEARNING OUTCOMES:

1. To give the student an understanding of the design, construction and operation of marine boilers and to prepare the student for the U.S.C.G. Third Assistant License Examination.
2. At the completion of this course the student should be able to:
 - a. Locate and identify all components relating to the training ship's boilers and steam systems.
 - b. Light off the fire tube boiler in the boiler lab
 - c. Conduct boiler water tests
 - d. Demonstrate proficiency in the following STCW element:
 - i. OICEW-5-2D Boiler water tests

GRADING:

The student's final grade will be computed as follows:

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| 1. Quizzes | 70% |
| 2. Final Examination | 30% |

COURSE ORGANIZATION:

Will consist of lectures, reading assignments, and training films.

CLASS ORGANIZATION:

Attendance is mandatory. Failure to attend class may result in a reduction of class grade. The proper uniform will be worn at all times. Do not bring any cell phones or electronic devices to class. For extra assistance, office hours will be posted.

SYLLABUS:

This course covers the following topics:

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. The Boiler Unit
Combustion, heat transfer, circulation
4. Boiler Capacity Limitations
Circulation, carryover, combustion rate
5. Saturated vs. Superheated Steam
Boiler classification
6. Sectional Header Boilers
7. Water Tube Boilers
8. Design and Construction of Boilers
9. Boiler Refractories
10. Internal Boiler Fittings
11. Superheaters and Desuperheaters
12. Heat Recovery Devices
13. External Boiler Fittings
14. Feedwater Regulators
15. Combustion –Fuel Oil
16. Combustion – Atomizers, Registers, Fuel Oil Systems
17. Combustion – Chemistry of Combustion
18. Combustion – Stack Gas Analysis
19. Boiler Water Treatment
20. Boiler Operation