

Instructor: CAPT Jim Albani

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Office Hours: Mon., Wed., Fri.: 0900-10:00, or by appointment

Prerequisites:

Calculus I

Text:

Required: Modern Marine Engineer's Manual, Vol. 1 (Osbourne or Hunt)

Recommended: Engineering Training Manual TS Kennedy (Haynes)

Recommended: Marine Engineering Workbooks, Vol. 1, 2, and 3 (Haynes)

Handouts will be distributed during class lectures and lab instruction as required.

Student Notebook:

The course content will be delivered in a variety of formats including blackboard presentations, Power Point presentations, Handouts and reading assignments. Each student will be required to have a 3 ring binder notebook for the taking of notes and keeping of class handouts, etc. My expectation is that students maintain and add to their notebook throughout the semester. This should aid the student in preparation for quizzes, etc. To encourage a well-kept notebook, extra credit of up to 2 points may be awarded to one's final grade. What constitutes a well-kept notebook is solely at the discretion of the instructor.

Caution:

- Students are required to bring their notebook and writing utensils. See Student Notebook above
- No food or drink of any kind is allowed in the classroom. Have your breakfast before the start of class.
- Leaving the class is to be discouraged. If you feel it's an emergency, you may raise your hand and ask for permission to leave. The Class is 50 minutes long. If I can be here, so can you!
- Smart phone or smart watch use of any kind is not permitted in class, and shall be silenced and stored out of sight before entering the class room, and remain so for the entire duration the class. There will be a 2% deduction from the final course average for each violation of this policy.
- Programmable calculators are not allowed during quizzes and exams
- Cell phones may not be used as a calculator
- No smart watches can be used in class, during quizzes or the final.

Uniform:

No boilers suits are allowed in the classroom, only the proper uniform of the day as announced by the Commandant of Cadets. If you come to my class in a boiler suit you will be told to leave and will not be allowed back into my class until you are in the proper uniform.

Course Description:

Steam Generators covers the design, construction, and operation of steam generators (boilers). It also considers fuels and their combustion, combustion equipment, combustion control, feedwater regulators, air heaters, economizers, superheaters, reheaters, boiler water treatment, and auxiliary boilers.

Course material will be presented in various formats including PowerPoint, blackboard, handouts, etc. Homework consist of reading and other assignments. The assignment topic matter may be included in weekly quizzes and the final exam.

The laboratory portion aboard the Academy’s training ship and lab is included, emphasizing boiler external fittings, safety valves, fuel oil systems, and main/ auxiliary steam systems to enhance the understanding of material presented in the course.

Attendance:

- Attendance is mandatory along with class participation for all class lectures and lab instruction. Special liberties DO NOT COUNT as excused
- Students who miss four (4) or more classes will automatically fail the course.
- For each unexcused lecture absence, the final grade will be reduced by 2 percent
- 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 without perfect attendance**. Missing a quiz equals a **ZERO**
- Students will be allowed two excused absences from class lectures provided they provide notification twenty-four hours before the scheduled class
- Lab class are mandatory. An “incomplete” course grade will be issued if all labs are not completed.

Communication:

- A key to your success in my class is communication. If you are having trouble understanding the material, an upcoming scheduling conflict, concerns or other issues you need to address, reach out to me early in the process. Ideally via e-mail or an office visit.
- I have an open door policy. I recommend you take advantage of it. The time to talk to me is before these conflicts become issues that will negatively affect your grade.

Grading:

- Quizzes (Weekly on Friday) 70%
- Final 20%
- Lab 10%

Grading Scale:

A: 95-100	C+: 77-79
A-: 90-94	C: 74-76
B+: 87-89	C-: 70-73
B: 84-86	F: >70
B-: 80-83	

Note:

This is a STCW required course; the only grades earned in this class will be “A, B, C, or F.” The lowest passing grade is a C-. If you have below a 70, you will fail the course and have to repeat the course again.

Cheating:

Cheating will not be tolerated. Disciplinary action will be taken, including referral to the Dean. A zero will be given to both the cheatee and the cheater.

Learning Outcomes:

The goal of this course is to give students an understanding of the design, construction and operation of marine boilers. Success in this course will be measured primarily through weekly quizzes and application of your understanding of the construction, operation and maintenance of marine boilers.

Learning Objectives:

At the completion of this course, the student should be able to:

- Understand the design, construction, and operation of marine boilers
- Comprehend basic thermodynamics and steam tables
- Demonstrate proficiency in solving fundamental engineering calculations
- Understand both firetube and watertube boiler fundamentals and operation
- Explain boiler refractories
- Comprehend internal boiler fittings
- Describe properties of superheaters and desuperheaters
- Compare/Contrast heat recovery devices
- Classify and Examine external boiler fittings
- Explain combustion theory
- Demonstrate knowledge of boiler water chemistry and treatment
- Show proficiency in boiler operation

STCW 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 assessment:

- **OICEW-5-2D** Boiler water test

Note: While every effort is made to adhere to the syllabus, instructor reserves the right to amend the course content as required.

Massachusetts Maritime Academy 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 the Director of Disability Compliance.

Reading Assignments:

Reading assignments are mandatory. The material in the reading assignments may be included on quizzes, even if it has not been reviewed in class. Reading assignments may be amended as the course moves along.

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| 1. Course Introduction: Basic concepts: BTU's, pressure, temperature, etc. | Handout |
| 2. Properties of Steam: Superheated, saturated steam, latent heat, steam quality, etc. | Handout |
| 3. Boiler Capacity Limitations: Circulation, carryover, combustion rate, etc. | Handout |
| 4. Boiler Classification: Firetube boilers, watertube boilers, auxiliary, etc. | MMEM p.5-1 to 5-13 |
| 5. Design and Construction of Boilers | Handout |
| 6. Boiler Refractories | MMEM p.5-26 to 5-27 |
| 7. Internal Boiler Fittings | MMEM p.5-43 to 5-47:49 |
| 8. Superheaters and Boiler Tubes | MMEM p.5-27 to 5-33 |
| 9. Heat Recovery Devices & Desuperheaters | MMEM p. 5-33 to 5-38 |
| 10. Boiler Water Chemistry & Blowdown | MMEM p. 5-80 to 5-87 |
| 11. External Boiler Fittings, Sootblowers, Safety Valves | MMEM p. 5-39 to 5-42 |
| 12. Feedwater Regulators, Gage Glass & Drum Level Indicators | MMEM p. 5-44 to 5-47 |
| 13. Combustion: Atomizers, registers, fuel oil, & fuel oil systems | MMEM p. 5-21 to 5-26 |
| 14. Combustion: Chemistry of combustion, stack gas analysis | MMEM p. 5-13 to 5-20 |
| 15. Boiler Operation and Controls | MMEM p. 5-49 to 5-79 |