Course: Steam Generators; EN-3131-13 & 14 **Fall 2022**

Class meets: M/W/F 10:00-10:50 (class 13), 11:00-11:50 (class 14)

Instructor: CAPT Jim Albani Office: Room 208A Harrington
Phone/E-Mail: 508-830-5270 / jalbani@maritime.edu
Office Hours: M: 12:00, W: 09:00, F: 09:00 or by appointment

Prerequisites:

Calculus I

Text:

Required: Modern Marine Engineer's Manual, Vol. 1 (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.

Course Delivery Method:

Course will be delivered in person. With regard to the ongoing Covid19 Pandemic, while every effort is made to safely allow in person classroom and lab participation, if conditions change on the ground, the administration or faculty reserves the right to modify the teaching format.

All proper safety protocols prescribed by MMA must be adhered to while in my classroom or lab. Not following proper pandemic safety protocols is grounds for immediate dismissal from my class.

Student Notebook:

The course content will be delivered in a variety of formats including Blackboard presentations, Power Point lectures, handouts and reading assignments. Each student will be required to have a three ring binder notebook for the taking of notes and keeping of class handouts. My expectation is that students maintain and add to their notebook throughout the semester. This will aid the student in preparation for quizzes, the final exam and their USCG License Exam. To encourage a well-kept notebook, I will occasionally allow the use of the student's notebook during a quiz.

Black Board:

Material shared in class, such as handouts, static Power Point presentations, etc. will be posted on Blackboard. Make sure you can access Blackboard to download class materials, review PowerPoints in preparation for quizzes, etc. Class static Power Point presentations are typically posted within a few days following the class lecture.

Caution:

- Students are required to bring their notebook and writing utensils to class. See Student Notebook above
- No food or drink of any kind is allowed in the classroom.
- 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 one (1), point 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.

Sleeping in class:

Any student sleeping during any part of my class will be dismissed from class. This will be considered an absence from class with (1) point deducted from the Final Grade Point average for each occurrence.

Course Description:

This course 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.

The laboratory portion aboard the Academy's training ship and shore-side labs 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. The laboratory grade is generated by you lab instructor and will consist of 10% of your final course grade.

Attendance:

- Attendance is mandatory and will be taken at the start of each class.
- As an STCW required course, 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 one (1), point.
- Students with perfect attendance will have their lowest quiz grade dropped.
- Except for an excused absence, there will be **NO** make-up quizzes offered. Missing a quiz equals a **ZERO** for that quiz.
- Students will be allowed two excused absences from class lectures provided they provide notification twenty-four hours before the scheduled class
- Labs are **Mandatory**. An "incomplete" course grade will be issued if all six 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.*
- *Check your e-mail regularly. In the event I have to contact you or the entire class before a regularly scheduled lecture, it will be by e-mail.*
- *E-mail is the best way to contact me outside of the classroom. jalbani@maritime.edu*

Grading:

- Quizzes (most weeks on Friday) 70%
- Final exam 20%
- Lab 10%

Grading Scale:

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

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.*

Academic Honesty:

Cheating will not be tolerated. If I have concerns of a violation of the honor code, I will pursue the violation with the Commandant of Cadets. In serious cases, violation of the honor code can result in dismissal from the Academy. As a minimum, a zero will be given to both the cheatee and the cheater involved in that quiz, assignment, etc.

Students with Disabilities:

Massachusetts Maritime Academy is committed to providing reasonable accommodations to students with documented disabilities. Students who believe they may need accommodations in this class should contact the ADA Coordinator: Dr. Elaine Craghead in ABS Information Commons Room 320, by phone at 508-830-5120 or email at ADAcompliance@maritime.edu to discuss specific needs.

Learning Outcomes:

The goal of this course is to give students an understanding of the design, construction and operation of marine propulsion and auxiliary 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.

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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.

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