Course: Steam & Gas Turbines; EN-3233-14 & EN-3233-15 **Spring 2022**

Class meets: Mon, Weds & Fri; 11:00 (class 14), 12:00 (class 15), Harrington Building, Room 108

Instructor: CAPT Jim Albani Office: Room 208A Harrington
E-Mail: jalbani@maritime.edu
Student Hours: Mon, Weds, Fri: 9:00-10:00, or by appointment

Prerequisites:

Steam Generators

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 as required.

Course Delivery Method & Student Notebook:

The course content will be delivered in a variety of formats including 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 handout. My expectation is that students maintain and add to their notebook throughout the semester. This should aid the student in preparation for quizzes, final exam and USCG License prep. To encourage a well-kept notebook, I will occasionally allow the use of the student's notebook during the quizzes.

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 day or two following the class lecture.

Caution:

- Students are required to bring their class 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 there, 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. If I see it, I will confiscate it. There will be a one (1), point deduction from your final course grade 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 at any time, 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) points deducted from the Final Grade Point average.

Course Description:

This course covers the principles, design, operation, maintenance and repair of marine steam turbines including their reduction gears, thrust bearings, couplings, governors and lubrication systems. Line shafting, bearings and propellers are other included topics. This course also includes an introduction to the design and operation of gas turbines.

The laboratory portion consist of cutaway equipment, operational trainers, and simulators; and the use of actual power plant equipment to enhance the understanding of material presented in the course. The laboratory grade will be generated by the laboratory instructors and will consist of 10% of your final grade.

Attendance:

- Attendance is mandatory along with class participation for all class lectures and lab instruction.
- As an STCW required course, students who miss four (4) or more classes will automatically fail the course.
- For each unexcused class absence, the final grade will be reduced by 1 percent.
- 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 ZERO for that quiz.
- Lab classes are **Mandatory**. An "Incomplete" 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.*
- *Check your e-mail daily. In the event I have to contact you/the class before a regularly scheduled lecture this is how I will do it. E-mail is the best way to contact me outside of the classroom.*

Grading:

- Quizzes (Weekly on Fri) 70%
- Final exam 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.

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.

A word about in-person classes:

My expectation is to complete this semester in-person in the classroom. However, in the event that the campus is closed due to an increase or outbreak in Covid cases and we are forced to transition to a remote format, Blackboard Learn is the platform I will be utilizing.

Student Learning Outcomes:

Success in this course will be measured through examination and application of your understanding of the design, construction, and operation of marine steam and gas turbines.

Student Learning Objectives:

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

- Demonstrate basic construction and operation principles of marine steam turbines
- Demonstrate basic construction and operation principles of marine gas turbines
- Communicate basic construction and operation principles of shafting installations, including propellers
- Indicate basic construction and operation principles of purifiers
- Develop an understanding of the major components of a turbine and what their specific functions are
- Understand the theories of the basic principles of impulse and reaction design
- Provide a detailed explanation of the theory and construction of gas turbines
- Develop an understanding of how a steam turbine differs from a gas turbine
- Understand fundamental thermodynamics, steam tables, and Mollier chart
- Satisfy the USCG requirements of standards of training, certification, and watchkeeping (STCW) for the skill sets developed during the lab and lecture portions of this course

STCW Learning Objectives:

Demonstrate knowledge and understanding of the following STCW elements:

- OICEW-A4.1 Basic construction and operation principles of marine steam turbines
- OICEW-A4.1 Basic construction and operation principles of marine gas turbines
- OICEW-A4.1 Basic construction and operation principles of shafting installations, including propellers
- OICEW-A4.1 Basic construction and operation principles of purifiers

Demonstrate proficiency in the following skills:

- OICEW-4-2A Respond to engine room alarms
- OICEW-4-3B Prepare and start main gas turbine
- OICEW-4-3E Monitor main gas turbine operation
- OICEW-4-3H Secure main gas turbine
- OICEW-5-1H Start fuel oil or lube oil purifier
- OICEW-5-1I Shut down fuel oil or lube oil purifier
- OICEW-5-2A Light off main boiler
- OICEW-5-2B Secure main boiler
- OICEW-5-2C Bottom blow boiler
- OICEW-5-3B Respond to boiler high water alarm
- OICEW-5-3C Respond to boiler low water alarm
- OICEW-6-1A Transfer fuel
- OICEW-7-1C Pre-start inspection of steam turbo-generator
- OICEW-7-1D Connect ship service diesel generator to main switchboard

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

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.

The reading assignments below are from the *Modern Marine Engineer's Manual, Vol. 1* (Osbourne or Hunt).

- Chapter 1 – Thermal Sciences and Engineering 1-1 thru 1-47
- Chapter 3 – Steam Power Plants 3-1 thru 3-42
- Chapter 6 – Marine Steam Turbines 6-1 thru 6-58
- Chapter 4 – Bearing Application and Lubrication 4-1 thru 4-86
- Chapter 7 – Gas Turbines 7-1 thru 7-104
- Chapter 8 – Gas Turbine Fuels 8-36 thru 8-39
- Chapter 9 – Mechanical Transmission Systems 9-1 thru 9-63
- Handouts as needed