

**Massachusetts Maritime Academy**  
**Auxiliary Machinery One (EN-1211-15, 1222-13 ME/FE)**  
**Spring 2025 (3.5 Credits)**

**Instructor:** LCDR Roger Gill, Associate Professor (MMA)

**Office:** Harrington Building, Room 217A

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**Office Hours:** Mon., Weds., Fri., (11:00-11:50) RM HA 217

**Prerequisites:**

Engineering Systems and Safety (EN-1112); Intermediate Algebra (SM-0112)

**POLICIES:**

MMA cadets/students will comply with ALL updated MMA Policies and Protocols, including Medical Protocols.

**Cell Phones**

MUST be turned off and NO TEXTING during class! Your Cell Phone must be off and in your pocket. YOU CANNOT USE YOUR CELL PHONE AS A CALCULATOR!

**Laptops:**

Laptops may be used with my permission. Only dedicated websites are permitted! If you are not on a dedicated website, you will be dismissed from class with two (2) points deducted from the Final Course Grade!

**Class Conduct:**

Any student who distracts my class, whether verbal, written, electronic, or what I judge pertinent in my class, including inappropriately wearing the UNIFORM of the DAY, will be dismissed

from my class with three (3) points deducted from their FINAL COURSE grade. You will be reported to COMCAD.

**Uniform and Dress Code:**

Cadets are expected to be in the proper uniform of the day, as announced by the Commandant of Cadets Department. **NO BOILER SUITS!**

**NO FOOD or DRINKS in CLASS....**

*EXCEPTION.... You may drink water from your container or bottled water in my class.* YOU ARE RESPONSIBLE FOR REMOVING YOUR BOTTLE OR CONTAINER FROM CLASS AND FOR CLEANING UP ANY ACCIDENTAL SPILLS!!!!

USE HEAD PRIOR to class and ALL EXAMS! YOU CANNOT USE HEAD DURING AN EXAM! IF IT IS AN EMERGENCY, SEE ME.

**ATTENDANCE:**

Attendance is mandatory for class lectures and lab instruction. Daily Attendance will be taken. TWO (2) Points will be deducted from your Final grade for each class missed. Missing three (3) classes results in a FAILURE for this course. If you miss a class, for any reason, you are responsible for all lessons and assignments. **All medical/illness absences must be accompanied by a Signed medical document upon return to class.** You must attend your assigned class, no “switching” to an earlier class. You must take exams on scheduled dates, confirmed by me. If, due to an MMA sporting event/activity, in which the Dean acknowledges your absence, you must immediately schedule with me the appropriate time to make up this exam/Quiz, after which taken, the class exams will be returned.

**Late to Class:** One (1) Point for each class you are late will be deducted from your Final Course Grade.

**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 two (2) points deducted from the Final Grade.

**Special Liberty Policy:**

Please do not ask the Instructor to sign a special liberty request. The only special liberties recognized by the engineering department are those of an emergency nature, which are granted directly by the Commandant of Cadets office.

Students will be allowed **ONE EXCUSED ABSENCE** from class. This must be approved ahead of time by the Instructor.

**Learning Disabilities:**

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 the ADA Coordinator: Dr. Elaine Craighead, Asst. Dean, ABSIC 320, phone x5120, email: [ADAAcompliance@maritime.edu](mailto:ADAAcompliance@maritime.edu), hrs.: Monday - Friday, 8-4.

***A signed copy must be given to me at the beginning of the semester.***

**\*MMA Health Services** realizes that students may encounter situations that could impede their academic, personal, and social development and success. Counseling services are designed to help students address these concerns, increase their self-awareness, and empower them to manage challenging areas in their lives. To

schedule a confidential appointment, please email [Jlevesque@maritime.edu](mailto:Jlevesque@maritime.edu) or call ext. 1480.

### **Course Description:**

Auxiliary Machinery I is a (3.5) credit course that lays the foundation for future engineering courses. Students will learn the basic principles of construction, operation, maintenance, and repair of auxiliary machinery systems. Topics include pipe and fittings; valves, pumps, and heat exchangers; pressure, temperature, level, and flow measurement; piping and instrument diagrams (P & ID); and blueprint reading. Both shoreside and marine applications are discussed. This is a required course for all engineering students and contains STCW knowledge and practical elements. **A grade of C- or better is required to pass.**

### **Standards of Training, Certification, and Watchkeeping (STCW)**

Auxiliary Machinery I is an STCW Course. STCW policy requires a passing grade of 70 or higher for any STCW course. The STCW course grading will be A, B, C, C- or F. No "D" grading policy. You will Pass or Fail. Failing will require that you take Auxiliary Machinery I again.

### **The Course supports the achievement of the following Accreditation Board Engineering Technology (ABET) objectives:**

- An ability to apply knowledge of mathematics, science, and engineering.
- An ability to identify, formulate, and solve engineering problems.
- An ability to communicate effectively.

**Course Objective:** Auxiliary Machinery I prepares the student in the fundamentals of operation, maintenance, and repair of auxiliary

machinery systems. Knowledge of the construction and purpose of system components is paramount. Emphasis is placed on safety and the specific engineering topics and systems discussed.

**Notebooks:**

Students are expected to maintain a **NEAT** three-ring notebook for the course materials.

**Grading Policy:**

**Quizzes.....40%**

**Final Exam.....30% (Date TBD)**

**Homework.....20%**

**Labs.....10%**

**Grading Scale:**

A (95-100)	A - (90-94)	
B+ (87-89)	B (83-86)	B - (80-82)
C+ (77-79)	C (73-76)	C - (70-72)
F > 70		

**Homework:**

- Homework assignments will be given during class and posted on Blackboard Assignments with the due date.
- **LATE HOMEWORK NOT ACCEPTED!**
- **Homework:** A hard copy must be submitted in pdf format, stapled in the top-left corner, on my desk at the beginning of class on the date it is due.
- Homework must be neat and well-written/typed, or NO Credit will be given.

- There must be a “Title” page; see *Title Page Example* at the end of the syllabus.
- Questions from your assigned Homework will be on weekly quizzes and the Final Exam.

### **Examination Material:**

- There will be weekly quizzes and a Final Exam.
- Exams will be a mix of multiple-choice and written questions. Illegible written answers will receive ZERO Credit!
- If a quiz needs to be rescheduled, the new quiz date and subject material will be announced in class.
- Material for exams/quizzes will come from subject matter covered in Class, Aux One Labs, required reading assignments, Blackboard Course Content, handouts, homework, labs, safety, and USCG questions from [web.maritime.edu](http://web.maritime.edu) and any material I provide regarding our new ship, NSMV Patriot State.
- All written and drawn test answers must be neat, or no credit will be given. If topic/subject materials are to be changed for any quiz/exam, I will announce the changes to the class. Quizzes/Midterms will be returned after all students take the exam.
- SAFETY Topic material will come from class and lab and will be discussed in class.

### **Quiz Make-up:**

If you miss a quiz due to a MEDICAL or Major Family Issue, you must take the quiz at a mutually convenient time immediately upon returning to class.

## **TOPICS**

- Diesel Electric Cycle Review
- Steam Cycle Review
- Fasteners and Hardware
- Piping Identification
- Pipe Connection Methods
- Piping and Instrumentation Diagrams
- Valve Functions and Basic Parts
- Safety Valves and Relief Valves
- Pneumatically Operated Valves
- Steam Traps
- Filters and Strainers
- Temperature Measurements
- Pressure Measurements
- Level Measurements
- Heat Exchangers
- Non-Positive Displacement Pumps
- Positive Displacement Pumps
- Process Control

## **Textbooks:**

Online: [Introduction to Marine Engineering Manual](#)

Auxiliary Machinery, *U.S. Department of Energy* EN-1211

Auxiliary Machinery I Study Guide

**Website:** [web.maritime.edu/](http://web.maritime.edu/) Go to USCG License Exam Preparation, then MEWB Test Generator (7<sup>th</sup> Edition). Also, go to STCW Training Videos

**NO electronic devices** may be used during exams EXCEPT a non-data-transmitting calculator. Calculators MAY NOT be shared during an exam. Any infringement from this policy will constitute cheating and will be treated as such in accordance with regimental manual/academic policies. **YOU CANNOT USE YOUR CELL PHONE AS A CALCULATOR!**

• **TOPIC MATTER FOR EXAMS:**

- Required Reading and review of Blackboard Course Content
- Lectures
- Labs
- Handouts and posted documents
- Homework Questions

• **Topic matter must be READ and Viewed prior to class**

• **The Instructor reserves the right to prioritize topic matter, reading assignments, Blackboard Content, the number of tests, and test dates.**

• **You MUST take the FINAL EXAM on the ASSIGNED DATE Unless You have permission from me.**

**WEEKLY TOPICS.....Required Reading .....Required Blackboard Course Content Viewing**

- You are required to do your reading and view weekly Blackboard Course Content PRIOR to class! Bb Course Content is continually updated.

- *We will discuss Safety, the NSMV Patriot State Diesel-Electric System, and the Steam Cycle typically for the first (10) minutes of class, then continue on to the Topic of the Day.*

[Ch 6 Diesel Propulsion](#)

[Ch 7 Steam Propulsion](#)

[Ch 8 Electric Propulsion](#)

### **Week 1: ESS Review:**

[Chapter 1 Safety Intro to Marine Engineering Book Link](#)

### **Ch 3 Thermodynamics Link**

Thermodynamic Principles.....DOE Handbook pp. 9-30

Steam Tables.....Intro. to Steam Engineering  
pp. 157-160

[Required Blackboard Content Review Link](#)

### **Week 2: P& IDs, Measuring Instruments**

Piping and Instrumentation Diagrams.....DOE Handbook  
pp. 121-176

ISOMETRIC DRAWING in class

### **Ch 5.4 P& ID**

[Required Blackboard Content Review Link](#)

### **Week 3: Measuring Instruments, Fasteners**

#### **2.1 Unit Conversions**

#### **2.2 Length, Area, and Volume**

Measuring Tools..... Aux. Mach. I Study Guide  
pp. 19-30

Fasteners and Hardware..... Aux. Mach. I Study Guide  
pp. 9-18

Torque Wrenches..... Aux. Mach. I Study Guide  
pg. 37

[Required Blackboard Content Review Link](#)

## **Week 4: Pressure**

### [2.7 Pressure](#)

Basic Pressure Measuring Instruments..... DOE Handbook  
pp. 59- 71

Pressure scales, conversion factors.....Aux. Mach. I Study Guide  
pp. 73-95

(Gages, Pressure Instruments, Manometers, Transducers)

[Required Blackboard Content Review Link](#)

## **Week 5: Temperature, Level Measurements**

### [2.8 Temperature](#)

Level Measurements ..... DOE Handbook  
pp. 72-88

Temperature Scales, Conversion Factors.....DOE Handbook  
pp. 43-58

Basic Temperature measuring Instruments Thermocouples/RTD's  
..... Aux. Mach. I Study Guide pp. 63-71

[Required Blackboard Content Review Link](#)

## **Week 6: Piping/ Tubing/ Materials**

### [5.1 Pipe and Tubes](#)

Pipe/Tubing.....Aux. Mach. I Study Guide  
pp. 105-116

Pipe/Tubing Identification and Materials.....Aux. Mach. I Study Guide  
pp. 117-120

Pipe/Tubing Pipe Fittings and Joints.....Aux. Mach. I Study Guide  
pp. 121-137

Piping Problems.....Aux. Mach. I Study Guide  
pp. 138-145

[Required Blackboard Content Review Link](#)

## **Week 7: Piping/ Tubing/ Materials**

### **5.1 Pipe and Tubes**

Pipe/Tubing.....Aux. Mach. I Study Guide  
pp. 105-116

Pipe/Tubing Identification and Materials....Aux. Mach. I Study Guide  
pp. 117-120

Pipe/Tubing Pipe Fittings and Joints.....Aux. Mach. I Study Guide  
pp. 121-137

Piping Problems.....Aux. Mach. I Study Guide  
pp. 138-145

[Required Blackboard Content Review Link](#)

## **Week 8: Steam Traps**

Steam Traps..... DOE Handbook  
pp. 251-255

[Required Blackboard Content Review Link](#)

Aux Mach I Study Guide

pp. 159-172

## **Week 9: Valves, Gaskets**

### **5.2 Valves**

Valve Types, Parts, and Functions..... DOE Handbook  
pp. 201-250, 394-400

Aux Mach I Study Guide

pp. 187-243

Packing and Gaskets .....Aux Mach I Study Guide  
pp. 173-185

Regulating Valves-Spring Loaded.....Aux Mach I Study  
Guide pp. 219-231  
(Including Reducing Valves)  
Regulating Valves-Air Operated.....Aux Mach I Study Guide  
pp. 233-243  
Valve Actuators.....DOE Handbook  
pp. 244-250  
[Required Blackboard Content Review Link](#)

## **Week 10: Regulating Valves**

### **5.2 Valves**

Packing and Gaskets .....Aux Mach I Study Guide  
pp. 173-185  
Regulating Valves-Spring Loaded..... Aux Mach I Study Guide  
pp. 219-231  
(Including Reducing Valves)  
Regulating Valves-Air Operated.....Aux Mach I Study Guide  
pp. 233-243  
Valve Actuators.....DOE Handbook pp.  
244-250  
Relief and Safety Valves.....DOE Handbook  
pp. 240-242  
[Required Blackboard Content Review Link](#)

## **Week 11: Strainers, Heat Exchangers**

Heat Exchangers.....DOE Handbook  
pp. 293-310  
Strainers.....DOE Handbook  
pp. 256-264

## [Required Blackboard Content Review Link](#)

### **Week 12: Pumps, Bunkering**

#### [5.3 Pumps](#)

Positive Displacement Pumps.....DOE Handbook  
pp. 282-292

Non-Positive Displacement Pumps..... DOE Handbook  
pp. 265-281

Aux. Mach. I

Study Guide pp. 249-275

Bunkering and Bunkering Safety .....Class Discussion

Fuel Oil Transfer

#### [Required Blackboard Content Review Link](#)

### **Week 13: Pumps, Fuel Oil**

#### [5.3 Pumps](#)

Positive Displacement Pumps.....DOE Handbook  
pp. 282-292

Non-Positive Displacement Pumps..... DOE Handbook  
pp. 265-281

Aux. Mach. I

Study Guide pp. 249-275

Bunkering and Bunkering Safety .....Class Discussion

Fuel Oil Transfer

#### [Required Blackboard Content Review Link](#)

### **Week 14: Process Control**

Process Control.....DOE Handbook  
pp. 341-393

## Week 15: Power Plant Operation

**Learning Objectives:** At the completion of the course, the student should be able to:

- Demonstrate knowledge and understanding of the following STCW elements:
- [AB-E-A5.1](#) Basic knowledge of the function of auxiliary machinery
- [AB-E-A5.1](#) Basic knowledge of the operation of auxiliary machinery
- [AB-E-A6.1](#) Knowledge of oil transfer operations
- [AB-E-A6.1](#) Preparations for fueling and transfer operations
- [AB-E-A6.1](#) Procedures for connecting and disconnecting fueling and transfer hoses
- [AB-E-A6.1](#) Procedures relating to incidents that may arise during fueling or transferring operation
- [AB-E-A6.1](#) Procedures for securing from fueling and transfer operations
- [AB-E-A8.1](#) Safe operation of valves and pumps
- [AB-E-B1.1](#) Ability to use lubrication materials and equipment
- [OICEW-A4.1](#) Basic construction and operation principles of pumps
- [OICEW-A4.1](#) Basic construction and operation principles of heat exchanges
- [OICEW-A5.2](#) Operation of pumping systems
- [OICEW-A5.2](#) Routine pumping operations
- OICEW-C1.4 Methods for carrying out safe emergency/temporary repair

- OICEW-C1.7 Use of various types of sealants and packings
- OICEW-C2.2 Appropriate basic mechanical knowledge and skills
- OICEW-C2.5 Design characteristics and selection of materials in construction of equipment
- OICEW-C2.6 Interpretation of machinery drawings and handbooks

### **LABS:**

Labs will meet in Bresnahan Rm 126 or where the Lab Instructor designates. Bring lab handouts, given in class, with you. All labs must be completed to the satisfaction of the lab instructor. Any lab missed will cause the final grade to be issued as an “**INCOMPLETE.**” There are no make-up labs at the end of the semester. If you miss a lab, YOU are responsible for making it up.

### **Demonstrate proficiency in the following skills:**

ABE-1-6A Assist with fuel oil transfer

OICEW-8E2A Make emergency repairs

RFPEW-1H2C Shift and clean a basket-type duplex strainer

**Lab Attire:** Wear PPE: Long-sleeve Boiler Suit, Hard Hat, Steel-Toed Boots, Hearing Protection, Flashlight, Gloves.  
Bring (3) Ring Binder, Pen/Pencil, and Calculator.

For ALL HW Assignments go to:

**Blackboard Assignments and Tests**

**HOMEWORK Format:**

- The Project Report must contain a **Title Page**, a separate **Table of Contents**, and a separate **List of Abbreviations**.
- When using **abbreviations**, first identify the meaning for the abbreviation: for example, personal protective equipment (PPE).
- On the abbreviations page, list them alphabetically.
- The report font shall be **12-point Times New Roman**.
- Each page shall have **1-inch margins**; each paragraph shall be **double-spaced**, and each subsection shall be indented and labeled.
- All text in this report must be completed with Microsoft Word.

*See Title Page Example below.*

**HW TITLE**

Student Name

Department of Engineering, Massachusetts Maritime Academy

Course NAME and Number

DATE DUE

Associate Professor Gill

Date

**DATE SUBMITTED:**

**SUBMITTED BY:**

