



**Massachusetts Maritime Academy**  
**Auxiliary Machinery II**  
**EN-2111-12 Fall 2022**  
**9/7/22- 12/14/22**

Instructor: Asst. Professor  
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Office Location: HA-212A  
Prerequisites: Auxiliary Machinery I  
Credits: Three credits  
Course Schedule: M/W/F 0900-0950  
Course Location: BR-201

\*\*\*\*Student Hours: Monday: 10:00-12:00; Tuesday 11:00-12:00  
Additional hours by appointment  
\*\*\*Please keep in mind that I have an open door policy and I welcome and encourage you to stop by at any time.\*\*\*

## **Welcome to Our Course**

Auxiliary Machinery II is a continuation of Auxiliary Machinery I and covers the construction, operation, maintenance, and repair of basic power plant equipment. This equipment includes, but is not limited to steam traps, strainers, pumps, heat exchangers, condensers, air ejectors, deaerators, hydraulic systems, air compressors, and compressed air systems. The laboratory consists of CAD use to draw specific training ship systems; the use 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. [Lab time required]

## **Our Inclusive Learning Environment**

MMA and your professor value human diversity in all its richly complex and multi-faceted forms, whether expressed through race and ethnicity, culture, political and social views, religious and spiritual beliefs, language and geographic characteristics, gender, gender identities and sexual orientations, learning and physical abilities, age, and social or economic classes. Enrich yourself by practicing respect. It is my intent that individuals from all diverse backgrounds and perspectives be well-served by this

course, that your learning needs be addressed both in and out of class, and that the diversity that each of you bring to this class be viewed as a resource, strength and benefit. It is my intent to present materials and activities that are respectful of diversity. Your suggestions are encouraged and appreciated. Please let me know ways to improve the effectiveness of the course for you personally, or for other students or student groups.

For questions, concerns, or more information, contact your professor and/or the Director of MMA's Office of Intercultural Engagement Patrick Nobrega at [pnobrega@maritime.edu](mailto:pnobrega@maritime.edu).

### **ADA Policy**

The Academy offers, upon request, accommodations to students with documented learning disabilities. The ADA Coordinator, Asst. Dean Elaine Craghead, evaluates the documentation provided, determines appropriate services, and is available to discuss accommodations with students. The Disability Resources office is located in the Academic Resource Center, ABSIC 320. Students can drop in during normal business hours, M-F 0800-1600, or call x5120, or email [ADAcompliance@maritime.edu](mailto:ADAcompliance@maritime.edu).

## **Course Syllabus**

The purpose of this syllabus is to provide a course description, to state the objectives for the course, to describe course expectations, to provide the planned schedule of topics and readings to be covered during the semester, to specify the course's grading system, to specify important dates for the course, to provide a description of the meaning of grades, and to state University and Departmental policies related to disability accommodations and cheating/plagiarism.

While alterations are not planned, if any changes are made to this document, they will be clearly announced at the beginning of class periods.

## **Required Readings**

Texts:

Excerpts from DOE Fundamentals Book (given as handouts in class)

Engineering Training Manual TS Kennedy (Haynes)

USCG Workbooks

(Optional) Modern Marine Engineer's Manual, Vol 1 (Osbourne or Hunt)

The materials used in this class, including, but not limited to, exams, quizzes, and homework assignments are copyright protected works. Any unauthorized copying of the class materials is a violation of federal law and may result in disciplinary actions being taken against you. Additionally, the sharing of class materials without the specific, express approval of the instructor may be a violation of the Academy's Student Honor Code and an act of academic dishonesty, which could result in further disciplinary action. This includes, among other things, uploading class materials to websites for the purpose of sharing those materials with other current or future students.

# Course Objectives and Learning Outcomes

## Demonstrate knowledge and understanding of the following STCW elements:

- OICEW-A1.2 Change-over of remote/automatic to local control of all systems
- OICEW-A4.1 Basic construction and operation principles of air compressors
- OICEW-A4.1 Basic construction and operation principles of fresh water generators
- OICEW-A4.1 Basic construction and operation principles of steering gear
- OICEW-A4.1 Basic construction and operation principles of deck machinery
- OICEW-A4.3 Preparation, operation, fault detection and measures to prevent damage for auxiliary prime movers and associated systems
- OICEW-A4.3 Preparation, operation, fault detection and measures to prevent damage for auxiliary machinery
- OICEW-C2.3 Dismantling, adjustment and reassembling of machinery and equipment
- OICEW-C2.4 The use of appropriate specialized tools
- OICEW-C2.7 The interpretation of piping, hydraulic and pneumatic diagrams

## Demonstrate proficiency in the following skills:

- OICEW-5-1D Start and secure air compressor
- OICEW-8-2A Centrifugal pump maintenance (mechanical seal)
- OICEW-8-2B Reciprocating pump maintenance
- OICEW-8E2B Centrifugal pump maintenance (packing)

## Other objectives

- Read and follow written instructions.
- Read and understand a blueprint.
- Properly handle basic hand tools.
- Gain an appreciation of the dependence of the auxiliary systems serving a power plant.
- Understand the principles of operation and the construction details of Auxiliary Machinery.
- Disassemble and reassemble centrifugal pumps.
- Operate a pump, monitoring suction, discharge pressures and power requirements.
- Disassemble and reassemble a duplex, double acting reciprocating pump, set the steam admission valves properly, prove the correct settings by actual operation in a closed circuit system.
- Disassemble and reassemble a two stage reciprocating air compressor. Run the air compressor to demonstrate correct operation.
- Perform a complete pump alignment. Prove alignment within 0.002".
- Identify hydraulic components.
- Disassemble, inspect and reassemble hydraulic pumps and control devices.
- Construct hydraulic systems on hydraulic simulator.
- Operate hydraulic systems and demonstrate proper operation.

## Teaching and Learning Strategies

Success in this course will be measured through examination and application of your understanding of the installation, operation, and maintenance of Auxiliary Machinery and systems in the marine engineering field. Weekly quizzes will be used to measure the learning objectives. Homework will also be given to ensure students meet all learning objectives within this course.

## **Grading Scale:**

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

### Grading

Quizzes: 50%, Final Exam: 20%, Homework: 20%, Lab: 10%

NOTE: This is an STCW course. As such, the lowest passing grade is a 70. Anything below 70 is considered a failing grade.

## **Attendance**

Class attendance is required for both lectures and lab. Students should do their best not schedule an appointment that conflicts with class. However, I understand life sometimes gets in the way. Therefore, students are expected to inform (via e-mail, text or telephone) the professor prior to missing a class. Excused absences will not count against you. The professor has the authority to require replacement work for time missed from class. It is your responsibility to make sure that you complete homework assignments and prepare for weekly quizzes, even when you miss a class.

## **Student Behavior**

You are expected to conduct yourself in a professional manner at all times. You are expected to be respectful to the instructor, fellow classmates, and guest speakers. Any behavior that is disruptive or disrespectful – including but not limited to – talking when the instructor or fellow classmate is speaking, rudeness, listening to music, surfing the internet, checking social media, texting, talking on your cell phone, sleeping, etc. will not be tolerated and the student will be asked to correct the behavior and/or asked leave the class. If you need a cell phone for emergency purposes, leave it on vibrate. Entering and leaving the classroom during the class period are also major sources of distraction. It is your responsibility to be on time and to stay for the entire period. In circumstances where you need to leave early, simply alert me beforehand. Inappropriate behavior will not be tolerated. Additionally, no tobacco use of any form is permitted in class.

## **Academic Honesty and Integrity**

Cheating and plagiarism will not be tolerated in accordance with Massachusetts Maritime Academy zero tolerance policy. If you are caught cheating or plagiarizing on any assignment or exam you will receive a zero and the professor reserves the right to assign the student an automatic F in the course. All instances of cheating or plagiarism will be reported to the Department and Academy for further disciplinary action.

## Course Schedule

Reading assignments will be posted to Blackboard at the beginning of each week. These assignments may vary depending on the pace of the class.

1. Pump Overview
2. Centrifugal Pumps
3. Pump Curves
4. Reciprocating Pumps
5. Rotary Pumps
6. Seals and Bearings
7. Heat Exchangers
8. Air Compressors and Compressed Air Systems
9. Steam Systems
10. Feed Pumps and Feedwater Systems
11. Hydraulics
12. Pneumatics
13. Air Removal Equipment
14. Demineralizers
15. Evaporators, MSD, and OWS
16. Combined Cycle Operation
17. MARPOL and Environmental Regulations
18. Preventative, Productive, and Reactive Maintenance
19. Introduction to Process Control