

Auxiliary Machine II EN-2121
Fall 2021

Instructor: LT K. McClellan, EdD

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Office Hours: Tuesday, Wednesday, and Thursday, 1100-1200, or by appointment

Prerequisites:

Auxiliary Machine I

Entrance Requirements

- Demonstrate a basic understanding of piping systems
- Understand the construction and function of valves
- Understand the operation and design of pressure and temperature regulating devices
- Understand the construction, operation, and function of pressure and temperature measuring devices

Texts:

Excerpts from DOE Fundamentals Handbook

Engineering Training Manual TS Kennedy (Haynes)

USCG Workbooks

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

COVID-19:

If we have to move to an on-line learning format, all material will be presented via Blackboard. The course will switch to a blend of synchronous and asynchronous methods. An updated syllabus will be provided.

Caution:

- Cell phones will be taken and given to the Dean. Students are expected to bring notebooks and writing utensils.
- Programmable calculators are NOT allowed during quizzes and exams.
- Cell phones may NOT be used as a calculator.
- NO smart watches may be used in class, during quizzes or the final.
- Once class starts, if a cadet leaves the room, he/she will not be allowed back into the class.
- No food or drink allowed in the classroom except bottled water.
- All COVID-19 protocols and policies will be followed.
- You must always have your mask on in the lecture/classroom if required as the semester goes on, and it must cover your nose and mouth.

Course Description:

A continuation of EN-1211, this course covers the construction, operation, maintenance, and repair of basic power plant systems, steam traps, strainers, pumps, heat exchangers, condensers, air ejectors, deaerators, hydraulic systems and components, and air compressors and 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]

Attendance:

- Attendance is mandatory for all class lectures and lab instruction. Special liberties DO NOT COUNT as excused.
- 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**. Missing a quiz equals **ZERO**.
- For each unexcused lecture absence, the final grade will be reduced by 2 percent.

- Lab instruction classes are Mandatory. Disciplinary action will be taken if needed. An “Incomplete” grade will be issued if all labs are not completed by the end of the fall 2021 semester.
- **Students who miss three (3) or more classes will automatically fail the course.**

Grading:

Quizzes	50%
Tests	30%
Lab	10%
Homework/Participation	10%

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.

Dress Code:

All regimental cadets are required to be in the uniform of the day. No boiler suits are allowed in the classroom. For non-regimental students, business casual attire is required. For the lab, boiler suits are allowed; however, they must be clean and with no holes.

Food & Drink:

No food and drink allowed in the classroom except water.

Electronic Devices:

No electronic devices will be allowed in this class. The only device that can be used is a non-programable calculator during indicated quizzes or tests. If an electronic device is found being used, the student will be dismissed from class and a zero will be given for the day. The device will be given to the Dean’s Office.

Honesty:

Students are expected to be honest and forthright in their academic endeavors. Academic dishonesty includes cheating, inventing false information or citations, plagiarism, tampering with computers, destroying other people’s studio property, or academic misconduct. Plagiarism and cheating are not permitted. Students who are caught cheating will receive a zero for the assignment and may receive a failing grade for the entire course.

Blackboard:

Blackboard will be used to enhance the overall course content. It will be used to upload lectures, handouts, and videos. It is up to you to check your blackboard for material and to make sure you can log in. Blackboard will also be where homework is turned in and passed out. On-line quizzes will be found on Blackboard as well.

Homework:

Homework will be assigned and will be used to prepare cadets for quizzes. All homework assignments must be passed in on due dates with no exceptions. Late or illegible homework will not be accepted and will be graded as a zero. Not all homework will be returned to the students.

Quizzes:

Topic material for exams/quizzes come from the course textbook, lectures, labs, handouts, and material posted on Blackboard. Quizzes will be given each week. The instructor reserves the right to prioritize topic material, reading assignments, the number of tests and test dates. You must take the test on the assigned date.

Disability Accommodation:

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.

ADA Coordinator: Dr. Elaine Craghead, Asst. Dean
ABSIC 320
X5120 (Karen Nahigian)
ADAcompliance@maritime.edu

Reading Assignments:

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

Readings: Will be given out and amended as the course moves along

1. Pump Overview	Handout/Blackboard
2. Centrifugal Pumps	pp. 265-280
3. Pump Curves	Handout/Blackboard
4. Reciprocating Pumps	pp. 282-285
5. Rotary Pumps	pp. 286-292
6. Seals, Ball and Roller Bearings	Handout/Blackboard
7. Heat Exchangers	pp. 304-310
8. Air Compressors and Compressed Air Systems	pp. 311-318
9. Steam Systems	Handout/Blackboard
10. Feed Pumps and Feedwater System	Handout/Blackboard
11. Hydraulics and Systems	pp. 320-323
12. Pneumatic Systems	Handout/Blackboard
13. Air Removal Equipment	pp. 238-333
14. Demineralizers	p. 334-339
15. Evaporators, MSD, and OWS	Handout/Blackboard
16. Combined Cycle Operation	Handout/Blackboard
17. MARPOL/Environmental Regulations	Handout/Blackboard
18. Preventative, Productive, & Reactive Maintenance	Handout/Blackboard
19. Introduction to Process Control	pp. 341-400

Student Learning Outcomes:

Success in this course will be measured through examination and application of your understanding of the installation, operation, and maintenance of Auxiliary equipment 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.

STCW Learning Objectives:

- **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-A4.3** 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

Learning Objectives:

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

- Understand the installation, operation, maintenance, and repair of operating machinery
- Explain how to identify both positive and non-positive displacement pumps and how each operates

- Illustrate how air compressors operate
- Identify the different types of heat exchangers and how each operates
- Understand and demonstrate how vacuum pumps, air injectors, and deareators operate
- Distinguish how hydraulic systems operate down to the component level
- Summarize the basic operating characteristics of MSD's, OWS, and Evaporators
- Outline the basics of process control

Demonstrate proficiency in the following skills:

- **OICEW-5-1D** Start air compressor
- **OICEW-5-1E** Shut down 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

Note:

This syllabus is subject to change. Students will be notified if anything does change in the syllabus throughout the course.