

Auxiliaries I EN-1222

Spring 2016

Instructor: LT K. McClellan

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Office Hours: Monday, Wednesday, Friday: 1000-1100, or by appointment

Prerequisites: Engineering Systems and Safety

Text:

Auxiliary Machinery DOE Fundamentals Handbook

Engineering Training Manual TS Kennedy (Haynes)

Handouts will be distributed during class lectures and lab instruction

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

Course Description:

EN -1222 lays the foundation for future engineering courses. Students will learn the basic principles of construction, operation, maintenance, and repair of piping systems. Topics include pipe and fittings, valves, pumps, heat exchangers, pressure, temperature, level and flow measurement, piping and instrumentation diagrams (P&ID), and blueprint reading. Both shoreside and marine applications are discussed.[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 without perfect attendance**. Missing a quiz equals a **ZERO**
- For each unexcused lecture absence, the final grade will be reduced by 2 percent
- Students will be allowed two excused absences from class lectures provided they provide notification twenty-four hours before the scheduled class
- **Students who miss four (4) or more classes will automatically fail the course**

Grading:

- Quizzes 50%
- Final 30%
- Lab/Homework 10%
- Project 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-.

Dress Code:

You are expected to be in the proper uniform of the day as announced by the Commandant of Cadets.

Cheating:

Cheating will not be tolerated!!!!

Homework:

Homework is a key part in your learning. You are expected to do all homework/reading assignments. Please keep a notebook with all work.

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.

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

1. Steam Cycle Review
2. Fasteners and Hardware
3. Piping Identification
4. Pipe Connection Methods
5. Piping and Instrumentation Diagrams
6. Valve Functions and Basic Parts
7. Safety Valves and Relief Valves
8. Pneumatically Operated Valves
9. Packing and Gaskets
10. Steam Traps
11. Filters and Strainers
12. Temperature Measurements
13. Pressure Measurements
14. Level Measurements
15. Heat Exchangers
16. Non-Positive Displacement Pumps
17. Positive Displacement Pumps
18. Process Control

Student Learning Outcomes:

Success in this course will be measured through examination and application of your understanding of the principles of construction, operation, maintenance, and repair of piping systems.

Learning Objectives:

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

- Interpret machinery drawings and handbooks
- Interpret piping, hydraulic, and pneumatic diagrams
- Safely operate, pumps, valves, and pumping systems
- Conduct routine pumping operations

- Discuss the construction and operational principles of pumps, valves, and heat exchangers
- Discuss the methods of measurement of temperature, pressure, level, and flow
- Perform basic calculations and unit conversions involving system parameters
- Demonstrate basic mechanical knowledge and skill in a workshop environment

The course supports the achievement of the following 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

STCW Learning Objectives:

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 fuelling and transfer operations
- AB-E-A6.1 Procedures for connecting and disconnecting fuelling and transfer hoses
- AB-E-A6.1 Procedures relating to incidents that may arise during fuelling or transferring operation
- AB-E-A6.1 Procedures for securing from fuelling 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 exchangers
- OICEW-A5.2 Operation of pumping systems
- OICEW-A5.2 Routine pumping operations
- 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

Demonstrate proficiency in the following skills:

- ABE-1-6A Assist with fuel oil transfer

Design Project:

The project will be due May 25, 2016. This project is worth 10% of your grade. You will be allowed to work with one other member of the class. The objective of this project is to design an operating system. This system must have the following components:

- Some type of fluid that will be moved from point "A" to "B"
- There must be a tank, piping, valves, gasket material, fittings, and a pressure difference
- Temperature, pressure, and level indication must be shown
- There needs to be a P&ID with at least a two page write up about the system
- The P&ID must have a legend. It should be on the right hand corner of the page

Timeline:

March 23, 2016: Group members must be submitted to Lt McClellan

March 30, 2016: A paragraph must be submitted explaining the type of fluid that will be used and what type of system this project will be based off of

April 27, 2016: Draft outline is due with a draft P&ID

May 25, 2016: Final project due