

ENGINEERING SYSTEMS and SAFETY (EN-1112-13)
Fall 2022 (3) CREDITS
OFFICE HOURS: Wednesdays, 1300 to 1500 hrs., Thursday, 1200

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

Office: Harrington Building, Room 217A

Telephone and e-mail: Ext. 5202 rgill@maritime.edu

Office Hours: Wednesday 13:00 to 1500, Thursday, 1200. Email me prior to office hours to confirm the time of appointment. This may be an online appointment or a "Socially Distanced" office visit. If 'Office Hours' are changed during the semester, I will notify you.

COVID-19: It is expected that all MMA cadets/students comply with updated MMA Policies and Protocols

NO CELL PHONES IN SIGHT! NO TEXTING! Cell phones must be silenced in every class or I have the right to take your phone and send you to the Dean's Office.

Laptops: Used only with my permission and student must sit in front of class so I can view laptop screen, which is ONLY to be used for class. Any issues regarding this, I will deny Laptop use in my class. Also, NO RECORDING of MY CLASS, AUDIO or VISUAL, without my permission.

NO FOOD or DRINKS in CLASS

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

NO electronic devices may be used in 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.

UNIFORM AND DRESS CODE:

Cadets must be in the proper uniform of the day as announced by the Commandant of Cadets Department.

TEXTBOOKS:

MMA Course Notes: Introduction to Steam Engineering

BLACKBOARD: I will be communicating with you via Blackboard and email. YOU MUST CHECK YOUR EMAIL AND BLACKBOARD DAILY TO STAY CURRENT WITH CLASS

NOTEBOOKS:

Students are required to maintain a neat, three-ring notebook for the course materials. You must bring your calculator to class and exams. No sharing of any electronic devices during exams.

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.
- 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 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, after which taken, the class exams will be returned.

Students will be allowed one excused absence from class lecture if I decide it is for a valid reason. Students who miss "Three" (3) or more unexcused classes, will Automatically FAIL the course. Special liberties DO NOT COUNT as excused. If you must be absent due to extenuating circumstances, you must see me FIRST for consideration.

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 (2) points deducted from the Final Grade Point average.

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.

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 ADA Coordinator: Dr. Elaine Craighead, Asst. Dean, ABSIC 320, phone x5120, email:ADAcompliance@maritime.edu, Hrs.: Monday -Friday,8-4.

(We're here 8-4, Monday-Friday)

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

*MMA Health Services realizes that students may encounter situations which 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 or call ext. 1480.

Return students regarding LABS: If you have "Passed" the academic class but need to make-up lab section, You Must Inform Me the FIRST Day of Class if you have PASSED and Completed the accompanying Lab or Not.

All Engineering Labs (EN-1112L) must be attended and completed to the satisfaction of the lab instructors to receive a final grade in this course. A Wiper's Exam will be given at the end of Engine labs. You are responsible for all information taught and assigned to you in labs.

OSHA: You MUST take OSHA to pass this course. If you do not pass OSHA, for any reason, you will receive an Incomplete in my course. Your Academic grade will be submitted upon successful completion of OSHA, which may be the next year's class.

Lab Attire: Wear PPE; Long-sleeve Boiler Suit, Hard Hat, Steel-Toed Boots, Hearing Protection, Flashlight, gloves.

Bring (3) Ring Binder and Pen/Pencil and calculator.

*** IF YOU MISS A LAB, IT IS YOUR RESPONSIBILITY TO MAKE THAT LAB-UP, within that lab cycle (ASAP).

ASK ONE OF THE ENGINEERING LABS INSTRUCTRS IF YOU CAN ATTEND THEIR LAB.

THEN, YOU MUST IMMEDIATELY NOTIFY YOUR ORIGINAL LAB INSTRUCTOR THAT YOU MADE-UP THAT PARTICULAR LAB AND ON WHAT DATE AND WITH WHICH LAB INSTRUCTOR.

COURSE DESCRIPTION/OBJECTIVE:

To introduce the student to the field of Engineering Systems and Safety used on board the Training Ship and in the stationary power plant industry. This will include fundamental engineering thermodynamic concepts related to the steam cycle and its associated equipment, including Main and Auxiliary engineering equipment. The course will include basic safety specifications set forth in the STCW regulations and OSHA regulations. The importance of proper watch keeping, terminology, communications, pollution, and energy-control procedures will be discussed including worker fatigue. Engineering safety will always be prioritized.

STCW

Engineering Systems and Safety is a required STCW course for all engineering students (Marine, Facilities, and Energy Systems) and all Marine Transportation students. For these majors, a "C-" is the lowest passing grade.

GRADING:

- LABS..... 10% (Your Wiper’s Exam grade and OSHA grade will comprise your Lab grade. You are required to read all chapters in your Engineering Lab manual.).
- Exams.....60%
- Final Exam.....30%

Wiper’s Exam will be conducted online at the end of Engine labs. The Exam will comprise all material taught and assigned in Engine labs, including reading all the chapters in your Engineering Lab manual.

YOU WILL RECEIVE AN INCOMPLETE GRADE IF YOU MISS ANY ENGINE LABS OR DO NOT PASS OSHA.

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

- TOPIC MATTER FOR EXAMS will come from the course textbook, lectures, labs, handouts, and documents and videos posted in BLACKBOARD and Blackboard Course Content.
- The Topic matter is outlined in this syllabus and is Required Reading and VIEWING BLACKBOARD Course Content Material for all students in my class.
- The Topic matter must be READ and Watched prior to the following 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.

Topics

<u>Class Lecture</u>	<u>(REQUIRED READING)</u>	<u>(Required Blackboard Course Content)</u>
----------------------	---------------------------	---

CLASS ONE (Sept. 7, 2022)

Steam Cycle.....	Intro to Steam Eng., Ch. 1. pp. 1-15.....	(STEAM CYCLE)
4-Stages of the Steam Cycle.....	Intro to Steam Eng., Ch. 1. pp. 1-15.....	(STEAM CYCLE)

CLASS TWO (Sept 12, 2022)

Review

Steam Cycle.....	Intro to Steam Eng., Ch. 1. pp. 1-15.....	(STEAM CYCLE)
4-Stages of the Steam Cycle.....	Intro to Steam Eng., Ch. 1. pp. 1-15.....	(STEAM CYCLE)

CLASS THREE (Sept. 14, 2022)

Review

Steam Cycle..... Intro to Steam Eng., Ch. 1. pp. 1-15.....(STEAM CYCLE)
4-Stages of the Steam Cycle.....Intro to Steam Eng., Ch. 1. pp. 1-15.....(STEAM CYCLE)
Ship/Vessel Terminology..... Class.....(Ship Terminology)
Ship Emergency Alarms.....Class/handouts
PPE.....Steam Eng., CH 9, pp. 141-153
LOTO (Lock-Out/Tag-Out)Class/Handout
Ladder Safety.....Class/Handout.....(LADDERS)
Principles of Thermodynamics.....Intro to Steam Eng. Ch. 2, pp.19-39... .. (Thermodynamics PowerPoint)

CLASS FOUR (Sept. 19, 2022)

Review

Steam Cycle..... Intro to Steam Eng., Ch. 1. pp. 1-15.....(STEAM CYCLE)
4-Stages of the Steam Cycle.....Intro to Steam Eng., Ch 1. pp. 1-15.....(STEAM CYCLE)
Ship/Vessel Terminology..... Class.....(Ship Terminology)
Ship Emergency Alarms..... Class/handouts
PPE..... Steam Eng., CH 9, pp. 141-153
LOTO (Lock-Out/Tag-Out) Class/Handout
Ladder Safety..... Class/Handout.....(LADDERS)
Principles of Thermodynamics.....Intro to Steam Eng. Char 2, pp.19-39... .. (Thermodynamics PowerPoint)

CLASS FIVE (Sept. 21, 2022)

Review

Steam Cycle.....Intro to Steam Eng., Ch 1. pp. 1-15.....(STEAM CYCLE)
4-Stages of the Steam Cycle.....Intro to Steam Eng., Ch 1. pp. 1-15.....(STEAM CYCLE)
Ship/Vessel Terminology.....Class.....(Ship Terminology)
Ship Emergency Alarms.....Class/handouts
PPE.....Steam Eng., CH 9, pp. 141-153
LOTO (Lock-Out/Tag-Out)Class/Handout
Ladder Safety.....Class/Handout.....(LADDERS)
Principles of Thermodynamics.....Intro to Steam Eng. Ch. 2, pp.19-39... .. (Thermodynamics PowerPoint)
Basic Steam Table and Graphs.....Intro. to Steam Eng., Appendix A: Steam Tables

CLASS SIX (Sept. 26, 2022)

Principles of Thermodynamics.....Intro to Steam Eng. 2, pp.19-39... .. (Thermodynamics PowerPoint)
Basic Steam Table and Graphs.....Intro to Steam Eng., Appendix A: Steam Tables

CLASS SEVEN (Sept. 28, 2022) EXAM (1)

Principles of Thermodynamics.....Intro to Steam Eng. Ch 2, pp.19-39... .. (Thermodynamics PowerPoint)
Basic Steam Table and Graphs.....Intro to Steam Eng., Appendix A: Steam Tables

CLASS EIGHT (Oct. 3, 2022)

Review

Heat Exchangers/Condensers.....Class/ Intro to Steam Eng., Ch. 6 pp. 105-109.....(Heat Exchangers and Condensers)
Intro to Boilers.....Intro to Steam Eng., pp. 67-80.....(BOILERS)

CLASS Nine (Oct. 5, 2022)

Review

Heat Exchangers/Condensers.....Class/ Intro to Steam Eng., Ch. 6 pp. 105-109.....(.Heat Exchangers and Condensers)
Intro to Boilers.....Intro to Steam Eng., pp. 67-80.....(BOILERS)

CLASS TEN (Oct. 11, 2022) Tuesday is Monday's schedule

Review

Intro to Boilers.....Intro to Steam Eng., pp. 67-80.....(BOILERS)
Intro to Steam Turbines.....Intro Steam Eng., Chapter 5 pp. 83-103.....(Turbines)

CLASS ELEVEN (Oct. 12, 2022)

Review

Intro to Steam Turbines.....Intro Steam Eng., Ch 5 pp. 83-103.....(Turbines)
Pressure and vacuum conversions.....Intro to Steam Eng., Ch. 2pp. 20-23.....(Pressure)
Temperature Conversions.....Class, Intro to Steam Eng., Ch 2 pp. 28-30.....(Temperature)
Gages.....Class

CLASS TWELVE (Oct. 17, 2022)

Review

Intro to Steam Turbines..... Intro to Steam Eng., Ch 5 pp. 83-103.....(Turbines)
Pressure and vacuum conversions.....Intro to Steam Eng., Char 2pp. 20-23, class(Pressure)
Temperature Conversions.....Intro to Steam Eng., Ch 2pp. 28-30, class.(Temperature)
Gages.....Class.

CLASS THIRTEEN (Oct. 19, 2022) EXAM 2

Review

Intro to Steam Turbines..... Intro to Steam Eng., Ch 5 pp. 83-103.....(Turbines)
Pressure and vacuum conversions.....Intro to Steam Eng., Char 2pp. 20-23, class(Pressure)
Temperature Conversions.....Intro to Steam Eng., Ch 2pp. 28-30, class..... (Temperature)
Gages.....Class
Intro to DieselClass.....(Diesels)

CLASS FOUTEEN (Oct. 24, 2022)

Review

Intro to Steam Turbines..... Intro to Steam Eng., Ch 5 pp. 83-03.....(Turbines)
Pressure and vacuum conversions.....Intro to Steam Eng., Char 2pp. 20-23, class(Pressure)
Temperature Conversions.....Intro to Steam Eng., Ch 2pp. 28-30, class.....(Temperature)
Gages.....Class
Intro to DieselClass.....(Diesels)

CLASS FIFTEEN (Oct. 26, 2022)

Review

Intro to Steam Turbines..... Intro to Steam Eng., Ch 5 pp. 83-03.....(Turbines)
Pressure and vacuum conversions.....Intro to Steam Eng., Char 2pp. 20-23, class.....(Pressure)
Temperature Conversions.....Intro to Steam Eng., Ch 2pp. 28-30, class.....(Temperature)
Gages.....Class
Intro to DieselClass.....(Diesels)

CLASS SIXTEEN (Oct. 31, 2022)

Intro to Diesel Engines.....Class.....(Diesels)

CLASS SEVENTEEN (Nov. 2, 2022)

Review

Intro to Diesel Engine.....Class.....(Diesels)

Fatigue.....Class Movie.....(Safety)
Confined Spaces..... Class/Handout.....(Safety/ PPT/ Confined Space Video)
Electrical Safety.....Class.....(Safety/ PPT)

CLASS EIGHTEEN (Nov. 7, 2022)

Review

Fatigue.....Class Movie.....(Safety)
Confined Spaces..... Class/Handout.....(Safety/ PPT, Confined Space Video)
Electrical Safety.....Class.....(Safety/ PPT)

CLASS Nineteen (Nov. 9, 2022) EXAM 3

Review

Fatigue.....Class/Movie
Confined Spaces.....Class/Handout.....(Safety/ PPT/Confined Space Video)
Electrical Safety.....Class.....(Safety/ PPT)

Class Twenty (Nov. 14, 2022)

Review

Valves.....Intro to Steam Eng., Ch 3 pp. 43-59.....(Valves)

Class Twenty-one (Nov. 16, 2022)

Review

Valves.....Intro to Steam Eng., Ch 3 pp. 43-59.....(Valves)

Class Twenty-two (Nov. 21, 2022)

Review

Valves.....Intro to Steam Eng., Char 3 pp. 43-9.....(Valves)

Class Twenty-three (Nov. 28, 2022)

Review

Valves.....Intro to Steam Eng., Ch. 3 pp. 43-59.....(Valves)

Class Twenty-four (Nov. 30, 2022)

Review

Valves.....Intro to Steam Eng., Ch. 3 pp. 43-59.....(Valves)
Pumps.....Intro to Steam Eng., Ch. 8 pp. 121-140.....(Pumps)

Class Twenty-five (Dec. 5, 2022)

Review

Pumps.....Intro to Steam Eng., Ch. 8 pp. 121-140.....(Pumps)

Class Twenty-six (Dec. 7, 2022) EXAM 4

Review

Pumps.....Intron to Steam Eng., Ch. 8 pp. 121-140..... (Pumps)

Class Twenty-seven (Dec. 12, 2022)

Review

Pumps.....Intron to Steam Eng., Ch. 8 pp. 121-140..... (Pumps)

Review

Pumps.....Intron to Steam Eng., Ch. 8 pp. 121-140..... (Pumps)

Learning Objectives

At the completion of the course, the student should be able to demonstrate knowledge and understanding of the following STCW elements:

- AB-D-C2.1 Working in enclosed spaces
- AB-D-C2.1 Permit to work systems
- AB-D-C2.1 Lifting techniques and methods of preventing back injury
- AB-D-C2.1 Electrical safety
- AB-D-C2.1 Mechanical safety
- AB-D-C2.1 Chemical and biohazard safety
- AB-D-C2.1 Personal safety equipment
- AB-E-A8.1 Safe operation of hoists and lifting equipment
- AB-E-A9.1 Safe use and operation of electrical equipment
- AB-E-A9.1 Safety precautions before commencing work or repair
- AB-E-A9.1 Electrical isolation procedures
- AB-E-A9.1 Electrical emergency procedures
- AB-E-A9.2 Knowledge of the causes of electric shock
- AB-E-A9.2 Precautions to be observed to prevent shock
- AB-E-C4.1 Electrical safety
- AB-E-C4.1 Lockout/tag-out
- AB-E-C4.1 Mechanical safety
- AB-E-C4.1 Permit to work systems
- AB-E-C4.1 Working in enclosed spaces
- AB-E-C4.1 Lifting techniques and methods of preventing back injury
- AB-E-C4.1 Chemical and biohazard safety
- AB-E-C4.1 Personal safety equipment
- OICEW-A4.1 Characteristics of lubricating oil systems
- OICEW-A4.1 Characteristics of fuel oil systems

- OICEW-A4.1 Characteristics of cooling systems
- OICEW-C1.5 Safety measures to be taken to ensure a safe working environment
- OICEW-C2.1 Safety measures to be taken for repair and maintenance
- OICEW-C2.1 Safe isolation of shipboard machinery and equipment before personnel are permitted to work
- OICEW-D8.4 Knowledge of personal safety
- OICNW-C8.4 Knowledge of personal safety
- PS-SR-X3.1 Importance of adhering to safe working practices at all times
- PS-SR-X3.2 Safety and protective devices available to protect against potential hazards aboard ship
- PS-SR-X3.3 Precautions to be taken prior to entering enclosed spaces
- PS-SR-X3.4 Familiarization with international measures concerning accident prevention and occupational health
- PS-SR-X6.1 Importance of obtaining the necessary rest
- PS-SR-X6.2 Effects of sleep, schedules, and the circadian rhythm on fatigue
- PS-SR-X6.3 Effects of physical stressors on seafarers
- PS-SR-X6.4 Effects of environmental stressors in and outside the ship and their impact on seafarers
- PS-SR-X6.5 Effects of schedule changes on seafarer fatigue
- RFPEW-A1.3 Safe working practices as related to engine-room operations
- RFPEW-A3.2 Know escape routes from machinery spaces
- T-OPS-X3.2 protective clothing and equipment

Other Objectives

- Understanding of steam cycle component pressures temperatures and terminology
- Engine room watch keeping procedures
- Engine room safe working practices including lock-out-tag-out and confined space
- Engine room alarm and evacuation procedures and emergency equipment
- Basic maintenance of machinery and equipment
- Knowledge of personal safety and social responsibility
- Safe operation of boilers
- Fighting fires onboard ship
- Emergency equipment and emergency procedures

COURSE OUTCOMES:

- Understanding the (4) stages of the steam cycle
- Describe the components of the steam cycle
- Assess Emergency alarms, evacuation procedures, and equipment
- Recall basic engineering terminology and definitions
- Identify engine room safe working practices including lock-out –tag out and confined spaces
- Engine room watch keeping procedures
- Engine room safe working practices including lock-out-tag-out and confined space
- Engine room alarm and evacuation procedures and emergency equipment
- Awareness of basic maintenance of machinery and equipment
- Knowledge of personal safety and social responsibility
- Discuss the Safe operation of boilers

- Fighting fires onboard ship
- Emergency equipment and emergency procedures
- Thermodynamic concepts involved in the main steam cycle
- Knowledge of various types of valves used in engineering piping systems
- Knowledge of personal safety and social responsibility