

**EN-3111 ELECTRICAL MACHINES SYLLABUS**  
**MASSACHUSETTS MARITIME ACADEMY FALL 2022**

**INSTRUCTOR:** LT. WILLIAM HIBBARD

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**OFFICE HOURS:**

TUESDAY 1100-1150 ; WEDNESDAY 1000-1050 ; THURSDAY 1100-1150, or By Appointment.

**CREDITS: 3.0 TOTAL.**

\*Please note that EN-3111L (Electrical Machines Lab) is a separate 1 credit lab and not included in the course syllabus.

**COURSE DESCRIPTION:**

Students study AC and DC theory as applied to motors, generators, and power distribution systems. The course also considers preventative maintenance and repair of rotating and static electrical equipment; turboelectric drive principles and operation; and U.S. Coast Guard electrical engineering rules and regulations. The lab component covers ship and shoreside machinery.

This course consists of three 1-hour classes a week for a semester and a comprehensive final exam.

**LEARNING OBJECTIVES:**

To provide the student with an operational understanding of power systems, motors, and generators including single and three phase AC systems, DC systems, and storage batteries. At the conclusion of the course, the student should be able to demonstrate:

- Distinguish between single and three phase systems
- Provide an electrical load analysis of an AC system
- Mathematically correct the power factor of an AC system
- Define the differences in various types of transformers and compute electrical loads on them
- Describe the design and operation of electric generators, including single and three phase AC generators and DC generators
- Describe the methodology for correctly paralleling two AC generators and balancing the electrical loads on each
- Describe the construction, maintenance, and operation of motor controllers

**DEMONSTRATE KNOWLEDGE AND UNDERSTANDING OF THE FOLLOWING STCW ELEMENTS:**

- [OICEW-B1.1](#) Basic configuration and operation principles of electrical generators
- [OICEW-B1.1](#) Basic configuration and operation principles of electrical distribution systems
- [OICEW-B1.1](#) Preparing, starting, paralleling and changing over generators
- [OICEW-B1.1](#) Basic configuration and operation principles of electrical motors
- [OICEW-B1.1](#) Electrical motor starting methodologies
- [OICEW-B1.1](#) Basic configuration and operation principles of high-voltage installations
- [OICEW-B2.1](#) Safety requirements for working on shipboard electrical systems
- [OICEW-B2.1](#) Safe isolation of electrical equipment required before personnel are permitted to work on such equipment
- [OICEW-B2.2](#) Maintenance and repair of electrical system equipment
- [OICEW-B2.2](#) Maintenance and repair of electrical switchboards
- [OICEW-B2.2](#) Maintenance and repair of electric motors and generators
- [OICEW-B2.2](#) Maintenance and repair of DC electrical systems and equipment
- [OICEW-B2.3](#) Detection of electric malfunctions
- [OICEW-B2.3](#) Location of faults causing electrical malfunctions
- [OICEW-B2.3](#) Measures to prevent damage caused by electrical malfunctions
- [OICEW-B2.4](#) Construction of electrical testing and measuring equipment
- [OICEW-B2.4](#) Operation of electrical testing and measuring equipment

**ENTRANCE REQUIREMENTS:**

- Describe and use the fundamental concepts of dynamics as taught in Engine Physics II
- Solve simple circuits using Ohm's Law and Kirchoff's Law
- Describe Faraday's Law of Electromagnetic Induction

**REQUIRED TEXTBOOKS:**

- *Operating, Testing, and Preventative Maintenance of Electrical Power Apparatus (Hubert)*
- *Preventative Maintenance of Electrical Equipment (Hubert)*

**PRE REQUISITE:** SM-2224 Engineering Physics II

**DRESS CODE:**

Dress code will be uniform of the day as announced by the Commandant of Cadets Department. If students are returning from lab they are expected to change before the beginning of class. No Boiler Suits allowed in class. No Exceptions.

**BLACKBOARD:**

Digital media covered in the classroom including the class textbook will be posted on Blackboard. Students will be responsible for this information. This will include class presentations, homework assignments, and lab training videos to review before attending lab exercises.

**CELL PHONE & SMART TECHNOLOGY POLICY:**

Cell phones and internet-capable technology are not to be used during class. These instruments are to be on silent and out of view at all times unless otherwise instructed. Usage during class will result in authorized confiscation to the dean's office. Programmable calculators are permitted in class, but may not be allowed during exams. Non-programmable calculators are welcome at all times.

**FOOD, DRINKS, & LAVATORY USAGE DURING CLASS:**

Please refrain from bringing any kind of food or drink into the classroom. They will not be allowed.  
Please refrain from using the lavatory during class. It will not be allowed.

**ATTENDANCE POLICY:**

This course is governed by STCW rules and regulations.

STCW: International Convention on Standards of Training, Certification and Watch-keeping for Seafarers

\*\*Attendance is required for all labs and lectures in this course. For the lecture portion of the course a student may miss only 10% (up to a maximum of 4 lectures) before they are ineligible to complete the course.

Students will be rewarded for perfect attendance. For a perfect attendance record, the lowest quiz grade will be dropped.

Students will be penalized for an unexcused absence. Please inform me before the start of class (either by voicemail, email, or in-person) that you will be unable to attend class and the reason. If no prior notice is given by that student, the absence will be considered "unexcused" and there will be a 2 point deduction from his or her final grade for each unexcused absence.

Attendance includes being present at the beginning of class. Quizzes are typically given at the beginning of a class lecture and students will not be permitted to take the quiz or permitted into the classroom if they are tardy. Tardiness of more than 10 minutes will be considered an unexcused absence.

Absences that are given prior notice will not be penalized, but the student will not be allowed to drop his or her lowest quiz grade at the end of the semester. If the absent student is on a MMA sanctioned activity that includes an athletics event, MMA school-sponsored event, or Armed Forces duty / training, AND has discussed this prior to the absence with the instructor, he or she may still be eligible for perfect attendance.

**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.

**NOTEBOOK:**

Students are encouraged to take notes in lecture & lab and keep an organized three-ring binder. This notebook may be admissible for use as reference during some quizzes, so a better organized notebook can suffice as its own reward.

**SUBJECT MATERIAL AND READING ASSIGNMENTS:**

Course reading assignments and subject material covered will be assigned by the instructor on a class-by-class basis. Reading assignments may be posted on Blackboard, emailed to students by the instructor, or assigned during class. All reading assignments are pertinent material and subject to evaluation in quizzes, tests, and homework.

**HOMEWORK AND CLASS PARTICIPATION:**

Due diligence is essential for success in this course. The more participation and effort put forth the greater the successful result. Homework and class participation count for 10% of a student's grade. Students are expected to participate in class discussions, and ask questions pertinent to the subject material. Homework shall be collected on the Friday of the Week it is assigned. Late homework will not be accepted. Homework shall be legible, on **8.5 x 11 inch paper**, and stapled if more than one sheet. The homework submission shall be free of tears, rips, or frays. Homework is not returned to the student although may be discussed in class. The homework submission **MUST** have a heading at the top of the page including the student's name and Homework Set # at a minimum. Homework submissions must be hand-written original work.

**COURSE TOPICS:**

WEEK	CLASS WEEK	SUBJECT	BOOK CHAPTER(S)	HW SET#	HOMEWORK ASSIGNMENT
1	5-Sep	Capacitance, Inductance, Single Phase AC & Power Factor	4,5,6,7,8	1	Ch. 8 Questions 1-9
2	12-Sep	Single Phase AC & Power Factor	8	2	Ch. 8 Problems 1-13, 15,16
3	19-Sep	Three Phase Systems and Power Factor	9	3	Ch. 9 Questions 1-8
4	26-Sep	Three Phase Systems	9	4	Ch. 9 Problems 1-13
5	3-Oct	Transformers	10	5	Ch. 10 Problems 1-15 Ch 10 Question 1,3,6,11
6	11-Oct	Three Phase Induction Motors	11	6	Ch. 11 Questions 1-10 Ch.11 Problems 1-6
7	17-Oct	Three Phase Induction Motors	11	7	Ch. 11 Questions 11-17 Ch.11 Problems 7-12
8	24-Oct	Synchronous Motors	12 & 13	8	Ch. 12 Questions 1-11
9	31-Oct	Synchronous Motors	12 & 13	9	Ch. 13 Problems 1-8
10	7-Nov	AC Generators	14	10	Ch. 14 Questions 1-25 (odd)
11	14-Nov	AC Generators	14	11	Ch. 14 Problems 1-13
12	21-Nov	Single Phase AC Motors	16	12	Ch. 16 Questions 1-13
13	28-Nov	Single Phase AC Motors	16	13	Ch. 16 Problems 1-2
14	5-Dec	DC Generators	17	14	Ch. 17 Questions 1-8
15	12-Dec	DC Motors	18	15	Ch. 18 Questions 1-10

## 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 Craghead [ecraghead@maritime.edu](mailto:ecraghead@maritime.edu) ; Office: ABSIC 320 Tel: x5120 (Karen Nahigian) or email [ADAcompliance@maritime.edu](mailto:ADAcompliance@maritime.edu)

\*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](mailto:Jlevesque@maritime.edu) or call ext. 1480.

**GRADING:** Your final grade will be comprised as follows.

Weekly Lecture Quizzes	40%
Final	25%
Midterm Exam	25%
Homework & Class Participation	10%

## GRADING SCALE:

Please note that the minimum passing grade for this course is 70% due to the requirements of STCW. The course grading will be broken down as follows:

<b>A:</b> 95-100	<b>C+:</b> 77-79.9
<b>A-:</b> 90-94.9	<b>C:</b> 73-76.9
<b>B+:</b> 87-89.9	<b>C-:</b> 70-72.9
<b>B:</b> 83-86.9	<b>F:</b> < 70
<b>B-:</b> 80-82.9	

## ACADEMIC DISHONESTY - PLAGIARISM:

**Plagiarism:** According to the *Oxford English Dictionary* means, "to take and use as one's own." In academia this means taking and using the writing, ideas or work of another person and passing it in as your own work. Some of the most common forms of plagiarism are:

- Buying a paper from a research service or paper mill
- Turning in a paper or excerpts from a "free term paper" web site
- Cutting and pasting sentences and/or paragraphs from web sites
- Turning in another student's work as your own with or without the student's knowledge
- Turning in work that another student, friend, family member, etc. has written for you
- Copying directly from a source (book, magazine, Internet, etc.) without using quotations marks and giving credit to the author
- Copying directly from a source without using quotation marks and changing a few words. This does not make the work your own. Example: Changing the original word "asked" to "questioned"
- Paraphrasing or summarizing (putting someone else's words, ideas or work into your own words) without giving credit to the source
- Using any parts or all of a PONY (pass on to next year) file (including graphs, tables, etc.)

**Avoiding Plagiarism:** The main way to avoid plagiarism is to give credit to the sources you have used. You can do so by quoting directly, summarizing or paraphrasing. **In ALL cases, you must give credit to the author and/or source.** Depending on the assignment you are given, this may include a bibliography or works cited page. Always check with your instructor or professor to find out how this should be done in the particular discipline.

If you are not sure if you are plagiarizing from an outside source, you can always check with one of the Humanities professors regardless of the course in which the assignment is due. We are always willing to help students with any and all writing problems or concerns for any course, not just those in the Humanities Department. You may also go to the Writing Resource Center or the Academic Resource Center for help.

**Remember: any student committing an act of plagiarism will face consequences such as failing the project or the course. In addition, you may be reported to the academic dean for further action and possible suspension or expulsion from the school.**