

**Text:** Operating, Testing, and Preventive Maintenance of Electrical Power Apparatus, Charles I. Hubert, PE, Prentice Hall, ©2003

**Learning Objective:** 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. While not an exclusive list, not a complete list, at the conclusion of the course, the student must be able to:

- 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 motors, including single and three phase AC motors and DC motors.
- Describe the design and operation of electric generators, including single & 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 DC battery systems.

**STCW Learning Objectives:**

- 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

**Grading:** Quizzes: 35%; Exams 30%; Final Exam 25%; Homework 10%. The quizzes may include both in-class quizzes and Excel<sup>®</sup>-based special projects.

**Class format:** The objective of this course is to provide the student with a thorough knowledge of electric circuits and machines with an emphasis on shipboard and industrial applications.

The class makes extensive use of the Blackboard computer system. Students are expected to have access to this system for class notes and assignments. All students are encouraged to purchase a personal color printer to better utilize class notes available on Blackboard.

Quizzes may be given on any class day. Make-up quizzes and/or exams will only be considered for extraordinary circumstances. Homework is to be passed in every Friday and will not be accepted late. Homework shall be legible, completed on 8.5" x 11" paper, free of tears, rips, or frays, and stapled if on more than one sheet. Homework must be hand written. Attendance is mandatory; each absence will result in a one point deduction from the final course grade. Classes are held MWF. Tardiness and walkouts are expressly prohibited. Regimental students are required to be in the uniform of the day for all classes, without exception. See the back of this page for additional course regulations.

Electric Machines is an STCW required course. For students in the USCG Marine Engineering license track, a minimum grade of C- (70%) is required to pass the course and to receive STCW credit. All other students must receive a minimum grade of 70% to pass the course.

**Schedule<sup>1</sup>:**

WEEK	CLASS WEEK	SUBJECT	BOOK CHAPTER(S)	HOMEWORK
1	2 Sept	Capacitance, Inductance, Single Phase	4-6	Ch 4: problems 16, 17, 18 Ch 5: problems 10, 11
2	9 Mar	Single Phase AC	6-8	Ch. 6: even problems, 7-1
3	14 Sept	Power Factor	6-8	Ch. 8: even problems
4	21 Sept	Three Phase Systems	9	Ch. 9: odd problems
5	28 Sept	Transformers	10	Ch 10: even problem

<sup>1</sup> Subject to change

A. A. Gillis  
Office Hours: MWF: 0900-1000 and by appointment.

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*MMA is committed to providing reasonable accommodations to students with documented disabilities. Students who believe they may need accommodations for this class are required to contact Prof. Fran Tishkevich, Director of Disability Compliance, within the first two weeks of class at ext. 2208 or by email at [ftishkevich@maritime.edu](mailto:ftishkevich@maritime.edu)*

**EN-3111****Electric Machines****Fall 2015**

6	5 Oct	Three Phase Induction Motors	11	Ch 11: All Questions
7	12 Oct	Three Phase Induction Motors	11	Ch 11: All Problems
8	19 Oct	Synchronous Motors	12	Ch 12: All Questions
9	26 Oct	AC Generators	13	Ch 14: All odd questions
10	2 Nov	AC Generators	14	Ch 14: All problems
11	9 Nov	Single Phase AC Motors	14	Ch 16: All questions and problems
12	16 Nov	DC Generators	16	Ch 17: All odd questions
13	23 Nov	DC Motors	17	Ch 18: All even problems
14	30 Nov/7 Dec	Battery Systems / Review	18	Ch 27: All odd questions Ch 27: All odd problems

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1. Schedule: Monday, Wednesday, Friday: 0800-0900
2. Disabilities: If you have a disability and feel you will need accommodations in order to complete course requirements, please contact Director, Disability Compliance and Affirmative Action.
3. Quizzes and Exams: Quizzes may be held every Friday or at any other time as deemed necessary. Exams will be announced. If you have a disability and require extra time on an exam or quiz or require other accommodations, YOU are responsible to make these arrangements. Pop quizzes may be held at any time – please be prepared for class.
  - a. Quizzes: In-class quizzes are typically designed to be 10 – 15 minute quizzes. Ample time is usually provided so that they may be completed in class including 1.5 times the allotted quiz time for those with disabilities. For example, a ten-minute quiz would be handed out 15 minutes prior to the end of the class.
  - b. Exams are designed to take the entire 50-minute class period. Those requiring accommodations must request them prior to the exam so that a solution can be achieved.
  - c. Quizzes missed will not be allowed to be made up except for extraordinary reasons, medical excuses from sickbay, or collegiate sporting events and excused absences as allowed by the Academic Dean.
4. Use of Electronics:
  - a. Only non-programmable calculators are allowed in this class. Use of programmable calculators, including TI-83, TI-84, or similar type calculators are expressly prohibited. Additionally, any electronic device that can communicate with devices, including other calculators, cell phones, or other communication equipment are prohibited.
  - b. Programmable calculators are not allowed.
  - c. Any use of cellular telephones, text messaging equipment, or other communication devices in the class is expressly prohibited. Any such equipment used in class shall be confiscated and turned over to the Academic Dean or the Commandant of Cadets. Any student using such equipment in class will be dismissed from the class and will be considered absent for that class. Use of any such equipment during a quiz or exam may result in the immediate failure of the class for the semester and potential disciplinary hearings before the Honor Board. Per order of the Academic Dean, cell phones or other electronic equipment used in class may be confiscated by the instructor and turned over to the Dean.
5. Homework shall be collected every Friday. Late homework will not be accepted. Homework shall be legible, on 8.5 x 11 inch white paper, and stapled if on more than one sheet. The homework paper shall be free of tears, rips, or frays. It is the student's responsibility to leave the due homework at the end of the class period. Homework must be hand written original work.
6. Blackboard is used extensively in this class. It is in the student's best interest to utilize it. It is the responsibility of the student to gain access to Blackboard. Students are encouraged to purchase and use a personal color printer for class notes.
7. Office Hours: Office Hours: Monday, Wednesday, & Friday 0900-1000 and by appointment. Please assume that if I am in my office, I am available for you. In addition, please email me with immediate concerns.
8. EMAIL: [agillis@maritime.edu](mailto:agillis@maritime.edu). Students are required to check their email accounts for class messages, assignments, etc.
9. Attendance: Students shall attend every class. One point per unexcused absence may be deducted from the student's final grade.
10. Attire: All regimental cadets shall be in the proper uniform of the day during class. Boiler suits or other work uniforms are never authorized in class. Non regimental students are expected and required to maintain a business casual attire.
11. 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.

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