

Massachusetts Maritime Academy
Department of Engineering

Fall 2012
M. H. Kane

MWF 1100-1200
Room BR 222

EN 3212
Electronics

Instructor:

Dr. Matthew H. Kane; e-mail: mhkane@maritime.edu
Office: Harrington 216A; phone: 508-830-5000 x2075
Office Hours: MWF 10:00 – 11:00 am or by appointment

Textbook:

Curtis. D. Johnson, *Process Control Instrumentation Technology*, Eighth Edition (2006). ISBN 9780131194571

Additional references:

Mitchel Schultz *Basic Electronics*, Eleventh Edition (2011) ISBN 9780073222769
Roger Tokheim *Digital Electronics: Principles and Applications*, Seventh Edition (2008) ISBN 9780078289002

Overview:

This course provides an overview of modern electronic systems used by the marine and power industries for automation, system monitoring, and control. Electronic components and circuits are categorized by function (sensor, transmitter, actuator, or controller), signal type (analog or digital), and technology (computer, microelectronic, solid-state). Students will develop skills in applying scientific and technical knowledge to engineering practice, acquire an ability to engage in life-long learning, and have an awareness of contemporary issues since electronics plays such a big role in today's facilities and maritime industries and has a large impact on the world economy.

Learning Objectives:

- Understand the relationship of component blocks and signals in electronic systems
- Define primary circuits and components used for analog signals and conditioning
- Define primary circuits and components used for digital signals and conditioning
- Read analog and digital circuit diagrams, and identify basic electronic components
- Understand the used of solid-state devices for amplification and switching applications
- Read and understand PLC and ladder logic circuits used in discrete-state applications

Prerequisites:

1. Engine Physics II (SM2224)
2. Calculus II (SM2113)

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Outline:

1. *Review of Circuit Analysis Techniques*
2. *Analog Systems*
3. *Digital Systems*
4. *Analog Signal Processing*
5. *Resistance, capacitance, inductance, impedance*
6. *Voltage dividers and bridges*
7. *Filters*
8. *Operational amplifiers*
9. *Basic Semiconductor Physics*
10. *Diodes, Transistors and solid state relays*
11. *Digital Signal Processing*
12. *Boolean Algebra and Logic Gates*
13. *Karnaugh Maps*
14. *Digital to Analog Converters and Analog to Digital Converters*
15. *Programmable Logic Controllers*
16. *Ladder Logic*

Grading:

- | | |
|-----------------------------|-----|
| 1. In-class Activities, | 20% |
| 2. Problem Sets and Quizzes | 20% |
| 3. Trimesterly Exams (x3) | 20% |
| 4. Final Exam | 20% |

(Final may be used to substitute for lowest exam score)

In-class activities will be conducted both on-paper and using the remote i-clicker system. All students are expected to remain current on the topics covered in the course and participate in these activities. These activities are graded predominantly for participation.

Problem sets will be given at the rate of roughly one other per week in those weeks not having an exam. These are intended to provide reinforcement or augmentation to the concepts covered in class. The problem sets will be graded on a “cliff” grading system.

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In addition, quizzes (announced or unannounced) will be given at the rate of roughly one per week. No make ups will be given for quizzes or in-class activities.

Three 1 hour exams will be give during the semester. A comprehensive final examination will be given during the final examination period.

At a minimum, the overall grade of 90% will receive an A, 80% a B, 70%, a C, and 60% a D. The instructor reserved the right to adjust these standards, but will only lower the minimum standard for each grade received.

Attendance:

Classroom attendance is expected of all students involved in the course. One unexcused absence will be forgiven. After that, each unexcused absence will lower the student's final course average by two points.

Uniform Policy:

Students are expected to be present in class in the uniform of the day.

Honor Code:

All students are expected to abide by the Massachusetts Maritime Academy Cadet honor code. Violations of the honor code will be dealt with strictly.

Homework:

Students will be assigned homework on approximately a weekly basis throughout the semester. Homework must be turned in by COB (5pm) on the date that it is due: no late homework will be accepted. Students may work in groups to complete the homework assignments, but the homework that is turned in must represent the individual effort of the student.

Disability Accommodations:

Any student in this course who has a disability that may prevent him or her from fully demonstrating his or her abilities should contact the Director of Disability Compliance and the instructor as soon as possible so we can discuss accommodations necessary to ensure full participation and facilitate your educational opportunities.