

ET 250 prep

Physics: Physical quantities vs. units

Algebra: Solving multiple equations and multiple unknowns, slope-intercept, square roots, exponents and logarithms, for all concepts

Trigonometry and geometry: degrees vs radians, sin, cos, frequency, time, amplitude, complex numbers, for AC and phasors (vectors)

Calculus: derivatives and integrals for 1st order differential equations, capacitors, and inductors.

Strategy:

Khan Academy to understand concepts:

<https://www.khanacademy.org/>

Online Practice Course- Linear Circuits 1: DC Analysis-

<https://www.coursera.org/learn/linear-circuits-dcanalysis#>

SAT, ACT, GRE, Schaum's Study Guides and test preps to practice

Link+ to check-out books for Free!!

**CSU Maritime Academy
Engineering Technology Department
ET 250/ET 250L, Electrical Circuits and Laboratory,
Fall 2017**

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<i>Office Hours:</i>	TBA: Email me for setting up an appointment
<i>Class Days/Time:</i>	ET250
<i>Classroom:</i>	ET250 Tech 146
<i>Prerequisites:</i>	MTH 211, PHY 205
<i>Co-requisites</i>	ET 250L

Course Description

ET 250: Principles and applications of DC and AC circuit analysis, node equations, Thevenin equivalent circuits, maximum power transfer, first order transients, simple filters and amplifiers, phasors, power, power factor, and reactive power in single and three phase systems.

ET 250L: Application of circuit elements and principles from ET 250 in laboratory measurements and analysis.

Student Learning Outcomes (SLO)

Upon successful completion of this course, students will be able to:

Apply their knowledge to support the Student Learning Outcomes in ET 370/370L and ET 350/350L

Student Learning Objectives

During this course, students will demonstrate their ability to:

Analyze simple ac and dc circuits using network reduction and nodal analysis

- Apply the voltage and current dividers to ac and dc circuits
- Produce a set of reference voltages from a given dc source
- Describe RC, RL, & RLC circuit behavior; circuit time constant and performance
- Use the Thevenin and Norton equivalent circuit to model real voltage sources
- Make and use phasor representations of sinusoidal voltages and currents
- Calculate apparent, real and reactive power and power factor in ac circuits
- Specify circuit modifications to adjust circuit power factor
- Specify components for simple RC high and low-pass filters
- Use oscilloscopes, power meters, volt and amp meters in a variety of applications
- Write technical reports that are clear, concise, correct and complete
- Produce professional quality technical reports using Word and Excel
- Apply course material to practice: heater, hoist, flash unit, timing, amplification, filtering

STCW

The Standards of Training, Certification and Watchkeeping (STCW) are prescribed by the International Maritime Organization, a committee of the United Nations, for all maritime training worldwide. It is the policy of the California Maritime Academy that all Marine Transportation students will achieve the following STCW competencies assigned to ET 250L Electric Circuits Laboratory.

STCW competencies: ET 250L Electric Circuits Laboratory

Item	STCW TABLE 1	STCW Competency
1	Troubleshoot an electrical distribution system	CMAE 3-3A
2	Plan and use electrical test equipment	CMAE 3-4A

Moodle

Copies of the course materials such as the syllabus, major assignment handouts, etc. may be found on Moodle, which is the course management software used for Cal Maritime courses. You are responsible for regularly checking Moodle for course updates. To access Moodle, go the CMA homepage and sign in

with your CMA user ID (all lowercase) and password. Click on the Moodle icon and you will see this course along with the other courses you are presently enrolled.

Required Texts/Readings

Textbook

“Electrical Engineering, Principles & Applications”, 6th edition by A. R. Hambley, ISBN: 978-0133116649

Other Readings

“University Physics”, 12th ed. by Young & Freedman

“Practical Electronics for Inventors”, by Paul Scherz

Other equipment / material requirements

Scientific/Graphing Calculator

Classroom Protocol

For ET 250 and ET 250L Cell phone use is not permitted and may result in a grade reduction and/or expulsion from the class.

For ET 250L, ATTENDANCE IS MANDATORY. RANDOM ROLL CALLS WILL BE MADE THROUGHOUT THE SEMESTER. PRIOR TO MISSING CLASS, A PHONE CALL OR EMAIL MUST BE SENT EXPLAINING WHY CLASS WILL BE MISSED. IN ADDITION, LEGITIMATE, SUBSTANTIATED WRITTEN EXCUSES MUST ALSO BE PRESENTED.

ET 250L fulfills requirements of the Standards of Training, Certification and Watchkeeping (STCW) Convention for Sea Time Equivalency. Due to the number of labs per semester, regardless of length, a student is allowed ONE absence. **A second absence shall result in being administratively dropped from the class.**

Late/tardy to labs or class is considered an absence.

Make up of labs or class will be handled on a case by case basis between the student and instructor.

There will be a sign-in sheet presented at the start of every lab.

ELECTRICAL SAFETY TRAINING: review basic marine electrical safety procedures. Lecture and Instructional Video: "Electrical Safety for the Qualified Worker" by Coastal Safety and Environmental. Demonstrate electrical safety procedures utilizing the "Sea River Maritime, Inc." Electrical Panel Emulator.

Assignments and Grading Policy

ET 250L: Laboratory topics are very closely coordinated with lectures and report writing is a significant component of laboratory work. Laboratory topics will be included on exams. Each Laboratory Report is graded and the lab score is folded into the overall course score. No late Lab Reports will be accepted. In such cases, a grade of "0" will be given. The laboratories, midterm exams and final exam are used to develop ***a single letter grade that is the same for the laboratory (ET 250L) and the lecture (ET 250).***

All Laboratory reports will follow the following format:

COVER PAGE. To include name of experiment and team members.

INTRODUCTION.PAGE. Description of experiment covering main points.

PROCEDURES and DATA PAGES. A description of what was done, along with supporting data and tables. Include a drawing of circuit and equal electric circuit

CONCLUSIONS PAGE. What was the outcome, what did you learn and conclude from the experiment?

ET 250: course grades will be determined from homework assignments, quizzes, exams, and the comprehensive final exam. Students can keep track of their grades in the course by looking at the Grade Book for the course in Moodle. Students should contact the instructor if they see any errors in their grade.

Homework: Assigned for each chapter and is a source of exam material.

Exams: Two, one-hour exams and a comprehensive final exam will be given. Missed exams receive a zero. There are no make-up exams.

Percent of Course Grade

Homeworks..... ±5%

Midterm 1.....	25%
Midterm2.....	25%
Comprehensive Final Exam.....	25%
Laboratories.....	20%

Late homework assignments will be penalized by 50% for every day late. Quizzes and exams cannot be made up for any reason, but no penalty will be assessed for missing a quiz or exam for an excused reason. Excused reason = mandatory Academy business. The final exam will be given on the day and time as scheduled by the Academy. No early or late final exams; no exceptions!!

Grading Scale: **100% - 90%** = **A**
 89% - 80% = **B**
 79% - 70% = **C**
 less than 70% = **F**

(Pluses and minuses will be given on final course grades.)

University Policies

Dropping and Adding Classes

Students are responsible for understanding the policies and procedures about add/drops, academic renewal, etc. Information on add/drops are available on the campus website and at:

http://www.csum.edu/c/document_library/get_file?uuid=9ac74015-15c2-4840-8626-04098ba4fcc9&groupId=72269

Students should be aware of the current deadlines and penalties for adding and dropping classes.

Academic Integrity

Students should know that the University's Academic Integrity Policy is available at https://www.csum.edu/c/document_library/get_file?uuid=ae78af01-0291-4d0f-ad97-060861e514d2&groupId=42499 Your own commitment to learning, as evidenced by your enrollment at Cal Maritime and the University's integrity policy, require you to be honest in all your academic course work. Instances of academic dishonesty will not be tolerated. Cheating on exams or plagiarism (presenting the work of another as your own, or the use of another person's ideas without giving proper credit) will result in a failing grade and sanctions by the University. For this class, all assignments are to be completed by the individual student unless otherwise specified.

Campus Policy in Compliance with the American Disabilities Act

California Maritime Academy is committed to providing reasonable accommodations to students with documented disabilities. Students who believe they may need accommodations are encouraged to contact the Disability Services Office (DSO) in the Student Engagement & Academic Success Center via email disabilityservices@csum.edu, preferably within the first two weeks of class. The DSO is located in Laboratory Building Room 102. For more information, see our website: <https://www.csum.edu/web/seas/disability-services>

Student Technology Resources

Computer labs for student use are detailed below. Please see the postings outside the labs to see when classes are scheduled for these locations. Otherwise, hours are listed as below.

Lab Name	Location	Hours
ClsRm Computer Lab	Classroom Building Room 105	24/7 Access via Portpass.
Lab 101	Lab Building Room 101	Open while building is open.

Student Engagement & Academic Success (SEAS) Center

SEAS is available to all students for learning, testing and accommodations for a variety of services including wrap-around accessibility support. Services provided through the SEAS include:

- Reduced distraction testing spaces
- Tutoring
- Access to assistive Technologies/Software
- Proctored testing
- Accessibility coordination with other departments on campus

ET 250/250L Electrical Circuits and Laboratory, Fall 2017, Course Schedule

Course schedule subject to change

Week	Date	Deadlines / Reading / Labs / Topics / Holidays
1	8/29	No HW Due / Ch1 / Introduction & 1. Resistor Networks 1 / Ohms Law, Units, Power, Passive Sign Convention, Independent/Dependent Sources, KCL, KVL /
2	9/5	HW 1 / Ch 2.1-2.5 / Safety / Resistor networks, Nodal Analysis / Mon 9.5 Labor Day
3	9/12	HW 2 / Ch 2.6-2.7 / 2. Resistor Networks 2 / Thevenin and Norton Equivalents, Voltage Divider, Current Divider,
4	9/19	HW 3 / pg 99-11, Ch 2.8, Ch 3.1-3.3 / 3. Reference Voltage and Voltage Divider / Linearity & Superposition
5	9/26	No HW due / Ch 1-3.3 / Lab Review / Midterm1 Review and Midterm 1
6	10/3	HW 4 / Ch 5.1, Ch 3.4-3.7 / 4. Wheatstone Bridge / Capacitors and Wheatstone Bridge
7	10/10	HW 5 / Ch 4.1-4.4 / 5. AC and DC Measurements / Inductors and Mutual inductance
8	10/17	HW 6 / TBA / 6. RC Circuits / Transients and First order RC and RL circuits, Diff eq review
9	10/24	HW 7 / Ch 5.1-5.4 / 7. RL Circuits / Trig Review and RMS, AC current, High Pass and Low Pass Circuits,
10	10/31	No HW due / Ch 1-4.4 / Lab Review / Midterm Review and Midterm 2
11	11/7	HW 8 / Ch 5.5-5.6 / 8. HP & LP Circuits/ Complex math review, Phasors, Impedance , / Fri 11.11 Veterans Day

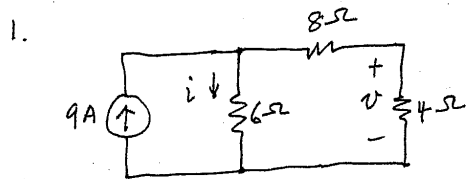
Week	Date	Deadlines / Reading / Labs / Topics / Holidays
12	11/14	HW 9 / Ch 5.5-5.6 / 9. Full Wave Rectifier / AC Power, Real, Apparent, Reactive, power factor
13	11/21	HW 10 / Ch 5.7 / Lab Review / Max Power Transfer, AC Thev/Norton, Wye and Delta Windings I / Thu Fri 11.24-25 Thanksgiving
14	11/28	HW 11 / Ch 5.7 / 10. Power and Power Factor / Balanced 3 Phase Circuits, Wye and Delta I
15	12/5	HW 12 / Ch 1-5 / 11. Troubleshooting an Electrical Distribution System / Balanced 3 Phase Circuits, Wye and Delta II, Final Review
Final Exam	12/12	No HW due / Ch 1-5 / No Lab / FINAL EXAM Venue and Time TBA

Tips for Success

1. (10 min/class) During breaks and after class, clarify any concepts
2. (30-60min/class) Clearly rewrite notes after class and throw away old notes
 - a. For anything not clear save as a question for office hours or email
3. (10 - 20 min/visit) Come to office hours frequently
4. (2-4 hrs/wk) Start HW early, but only after concepts are understood either through reading or lecture, and try not to use notes

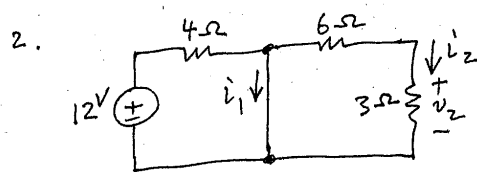
5. (1-2 hrs/wk) Choose other problems to tackle to reinforce concepts and try not to use notes
6. Explain the concepts to someone else
7. Prioritize sleep, go to bed early, and wake up early
8. Do work in the morning, the brain is more efficient
9. Get exercise to reduce stress and improve sleep

Practice Problems — KCL, KVL, Ohm's Law and Power



$$i = \underline{6 \text{ A}}$$

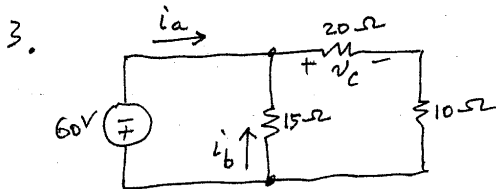
$$v = \underline{12 \text{ V}}$$



$$i_1 = \underline{3 \text{ A}}$$

$$i_2 = \underline{0}$$

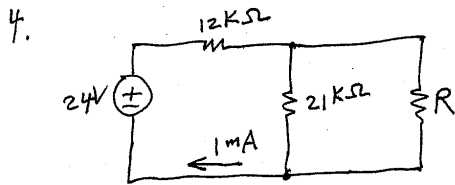
$$v_2 = \underline{0}$$



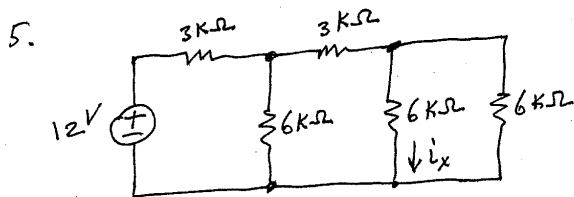
$$i_a = \underline{-6 \text{ A}}$$

$$i_b = \underline{4 \text{ A}}$$

$$v_c = \underline{-40 \text{ V}}$$



$$R = \underline{28 \text{ k}\Omega}$$



$$i_x = \underline{0.5 \text{ mA}}$$