

MELTEC 208
FUNDAMENTALS OF ELECTRICITY AND ELECTRONICS
COURSE SYLLABUS

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Course scope

MELTEC 208 is a one-semester course in the study of electrical and magnetic phenomena emphasizing applications for common consumer, commercial, and industrial devices. It examines the physical nature and laws of electricity and magnetism and the application of the scientific method. DC and AC circuits and their characteristics are examined, predicted, and measured. Electronic test equipment and voltage sources are utilized in the construction, troubleshooting and testing of electrical and electronic circuits. MELTEC 208 is approved by the State of California for the Department of Apprenticeship Standards (DAS) Electricians Training Program. This course meets DAS Electrician Trainee and Journey Level Recertification CA State Requirements.

Student Learning Outcomes

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At the end of this course the student will be able to

1. Properly use a digital multimeter to measure voltages, currents, and resistances in circuits.
2. Correctly calculate and predict voltages, currents, and resistances in circuits, simulated or real.

Bibliography

Required

ELTEC 208 – Course Package – 3rd Edition, compiled by Adrian DeAngelis. It contains SIEMENS STEP 2000 – Basic Electricity 1 and 2, Workbook, Lab guides, and Appendixes.

Recommended online resources

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Department of Energy Manuals

- Electrical Science [Volume 1](#), [Volume 2](#), [Volume 3](#), [Volume 4](#)
- Mathematics [Volume 1](#), [Volume 2](#)

[All About Circuits – Lesson in Electric Circuits](#) (online free basic electrical engineering textbook)

Class Requirements

A broad scope of issues is going to be covered along these classes. Lectures, presentations, videos, reading, labs, and homework will be the parts of a whole. Five hours a week on the classroom will demand several hours of reading and homework afterward. For each hour of lecture two hours of home study are expected, therefore students should plan 5 hours per week of dedicated time for reading and completing assignments. Students will not have to read the week's subject ahead of our weekly meeting, although it is not a bad idea. But, the reading of the class' material after the class - and as soon as possible - is a must-do.

For labs

A safe laboratory environment is essential. Safety procedures are most often given during the lecture period. If, in the opinion of the instructor, you are unaware of the proper safety procedures for a particular laboratory exercise because of excessive absences, you may not be allowed to participate in that exercise. After completing your laboratory assignments make sure that you leave the apparatus and the workstation in proper order. Eating and drinking is strictly prohibited in the lab.

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Attendance prior and after Census Day

Attendance will be taken daily. Regular attendance is essential to ensure success in this course and that laboratory procedures are clearly understood.

Students must give notice to the instructor if they are planning to miss a class before the second week (prior to census day) to avoid being dropped from the course.

After the second week it is students' responsibility to drop this course. If after the second week, and before the completion of the 75% of the course, a student stops attending but forgets to drop the class, the instructor could, unintentionally, overlook the situation and fail to drop the student from the roster. In such case, the final grade will be likely an "F". However, a student showing a pattern of several consecutive missed assignments can be interpreted as a permanent absence in which case the instructor may drop the student without giving previous notice.

Exams and Grading Criteria

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Class participation

Being on-time, staying on-task, and keeping self-engaged in the subject, although leave a lot of margin for subjectivities from the point of view of the student and the instructor, is going to be considered and awarded. "Class Participation" includes punctuality, readiness, engagement with the subject, cooperation, team spirit. It will be rewarded with 5 points (**5% of the total**)

Homework

Homework assignments come always after the lecture, and often after the lab, that address a subject. One week or more will be given to complete assignments (refer to schedule or daily agenda for the list of reviews, problems, and complementary questions). Due days to turn-in HW must be observed. These assignments are not only important elements to achieve good grades, but also important elements to prepare the exams. Homework not turned in on time will not be accepted unless extraordinary circumstances. **HW accounts for 20% of the final grade.**

Labs

Labs will be graded according to their completeness and neat presentation. They are due the same day of the homework related to them. Labs are important elements, maybe the most important element, in process of learning. **Labs account for 20% of the final grade.**

Exams

Summative Assessments

Summative Assessments will be given at the completion of a subject or related subjects. They necessarily will include themes from previous assessments although their emphasis will be in the latest covered matters. **These assessments account for 20% of the final grade**

Midterm

The midterm will be a brief and comprehensive exam including all subjects from week 1 up to association of capacitors, association of coils, RC and RL time constants. **The midterm exam accounts for 10% of the final grade**

Final

The final exam will cover the totality of the course. It will be held in common with all the other ELTEC 208 sections. A hands-on problem might be added where the student ability to build a simple circuit and the ability of using a DMM and/or an oscilloscope shall be evident. **The final exam accounts for 25% of the final grade and it must be correct in a 50% or more**. Not taking the final exam, or having an F as grade, automatically disqualifies the student who will fail the course. Only in very special cases a student that misses the Final will receive an incomplete grade (IF or ID) in order to give him/her the opportunity to take the exam another day. Fail to do so will grant an automatic F or D.

In summary

Participation	=	5%
Homework	=	20%
Labs	=	20%
Assessments	=	20%
Midterm	=	10%
Final	=	25%

Grades

Although some exception might apply, a “C” is required to complete successfully this course. That is the equivalent of the 70% of the total points (gathered between participation, homework, labs, and exams) with the strict condition of having not less than the 50% of the final exam correct.

The grading scale is as follows:

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A = 90 to 100%

B = 80 to 89%

C = 70 to 79%

D = 60 to 69%

F = up to 59%

Electrical Apprentices

Students enrolled in the DAS program (Electrical Trainees – ETs – working for a licensed contractor under the supervision of a journeyman) must pass this class in order to be accredited with the course's hours.

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Keys for Success

- Be on time
- During lectures try to take notes (do your best)
- LAB TIME IS PRECIOUS. It is a good idea to read the lab material ahead of time (perhaps before the class starts) to get familiar with it.
- During labs focus in the tasks at hand reading carefully the lab guidelines.
- If after reading a set of instructions in the lab guide it is not clear what to do, ask for clarification immediately (remember, lab time is precious). Don't stop to perform calculations, complete first the experimental issues building circuits and performing measurements – you can check with your instructor if the obtained results are correct. Calculations contained into labs can be performed after the practical tasks were completed.
- HOMEWORK IS VERY IMPORTANT. Complete your homework thoroughly, and as neat as you can. Always show your calculations.
- Do not let days go by. Start reading the class material and take care of the homework as soon as the lecture was delivered, whether or not the lab was completed. Prior the reading, review your class notes and the homework assignment, which will make your reading more effective.
- Keep the review questions next to you and answer the questions as soon as you found the key paragraphs that are related to the point. Summarize the main points. Good summaries will help you to prepare for exams. Mark the paragraphs, or keep notes on subjects, that are not clear in order to ask for clarification the following class.
- DO NOT FORGET TO TURN IN HW – KEEP UP WITH THE SCHEDULE!!!. If modification of the schedule were needed, it will be arranged in class.
- Keep all the class material in order, always keep with you a calculator, color pencils, and your digital multimeter.

- Keep track of what HW you turned in and the grades you are obtaining. These elements will give you a good idea of your progress and will show the areas that you need to work out.
- It is not bad idea to organize some group sessions to review concepts and get ready for the exams.
- Formal education, such as this class, is a short term commitment with long term consequences. Some family matters – little league, Halloween, a fishing trip, etc... - may need to take the back seat for a while. It is up to the instructor to do the upmost to deliver good content, but up to the student to achieve success.

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Generic 16-week schedule (10-week format courses follow same path and similar pattern)

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Week	Lecture subjects	LAB	HW due	Tests
1	Introduction to MELTEC 208 Math review. Concept of electrical potential and electron flow. Concept of DC and AC. Conductors and insulators. Basic electrical variables. Units and subunits. Resistors, types and uses, 4 and 5 band color codes. Basic instruments. Use of multimeters.			
2		Basics		
3	Ohm's Law. Energy and Electrical Power	Ohm's & Power		
4	Series Circuits	Series	Basics	
5	Parallel Circuits	Parallel	Ohm's & Power	ΣAssm #1 Basics
6	Compound Circuits	Series-Parallel	Series	
7	Capacitors. Principles. Basic ratings. Association. RC time constant.	Association of caps and τ	Parallel	ΣAssm #2 Ser&Par
8	Inductors. Principles. Basic ratings. Association. RL time constant.	Properties of inductors	Compound circuits	ΣAssm #3 Compound + Hands on
9	Waves. Peak and RMS values. Resistive circuits in AC. Basic use of oscilloscopes.	Use of scopes & FG	RC & RL and τ	Midterm
10	RL and RC circuits	RL in AC	Waves	

11	RLC circuits. Power in AC: True, Apparent, and Reactive power. Power Factor	RC in AC		ΣAssm #4 Caps&Coils
12	Electrical machines. Transformers	Transformers	RLC Series	
13	Semiconductors Part 1: The PN junction, the Diode. Rectifier circuits.	Experiments using diodes	XFMRs	ΣAssm #5 Waves
14	Semiconductors Part 2: Introduction to Transistors	Experiments using transistors	Diodes	ΣAssm #6 RLC Series
15	Semiconductors Part 3: Introduction to ICs	Experiments using common ICs		ΣAssm #7 Transformer s
16	FINAL EXAM			

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