University of California, Santa Cruz
Electrical Engineering Department
EE 101, Summer 2018

Introduction to Electronic Circuits

Lecture: Tu/Th 11-12:40, Jack Baskin Engineering (JBE) 165
Discussion: Mondays 1 P.M., JBE 165
Laboratory Room: JBE 150 (section times TBD)
Instructor: Mike Jaris, email: mjaris@soe.ucsc.edu
Office hours: Tu/W/Th 1-2 PM or by appointment, location: E2-239A
Teaching Assistants: Lin Jin, email:ljin7@ucsc.edu
Course Website: https://canvas.ucsc.edu

Course Description:

This is a foundation course in the discipline of electrical engineering. It draws on applied physics and requisite mathematical models necessary to understand fundamental electrical components and how to analyze their interconnected behavior in electronic circuits. A complete foundation in electric circuit theory is first developed. This includes ideal components and building blocks: resistors and the concept of resistance; energy storage devices, inductors and capacitors; voltage and current sources. These will be used to develop *engineering models* of non-ideal components and to analyze and design linear planar electric and electronic circuits. The necessary tools for this are an understanding of constant and sinusoidal signals and various elementary circuit theorems: Ohms Law, Thevenin and Norton equivalents, linearity and superposition, voltage and current dividers, maximum power transfer. Building on Ohm's Law, we will discuss two analysis techniques: node-voltage and mesh networks. To make use of all of this we need to develop two critically important concepts: electric *systems* provide us a means to naturally abstract complicated circuits into a "black-box" having only input and output *ports*. Although a system can have any number of ports, we will confine our treatment to *linear* 2-port "black-boxes" or *networks* having one input and one output port. This perspective enables us to comprehend the associated concepts of *source* and *load* impedances based on the idea of "looking into" a port. Later courses, like EE171, or EE103, require an intuitive understanding of these ideas. The system perspective will be employed to understand natural and forced response of linear circuits. This will first be done with DC, and then with AC or time-varying sinusoidal signals. From the latter topic we will introduce the invention of *phasors*, a technique that greatly simplifies the design and analysis of linear networks involving only sinusoids; it also enables us to understand the closely related concept of *impedance*. Finally, several topics from elementary electronics will be covered: basic analog wave filters (low-pass, high-pass, etc.) and an introduction to the operational amplifier or "op-amp" as an ideal electronic building block.

Laboratory and lecture are closely related and concurrent enrollment is required. Refer to the EE101L canvas website for details and lab coordination

References:
Required: Fundamentals of Electric Circuits, 6th ed. by Alexander, McGraw Hill 2017

Homework & quizzes:
Homework will be assigned and collected during class sessions, and will generally follow a weekly sequence; solutions will be handed out in sections for some questions (or posted to our web site) on the date of collection. Material will consist of problems from our text and other sources, supplementary and extra-credit problems. To receive full credit, your work must be college-level: it must be well organized, literately readable and show evidence of thoughtful attention to the problem itself. In particular, use of math equations should be justified with appropriate comments or discussions. *Sloppy, difficult to follow submissions will not be considered for grading*. Letter grades will be assigned for all homework as described following:

> **A:** Complete and thoughtful solution, conceptually correct. Note that this means numerical correctness is not the sole criterion.
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> **B:** Thoughtful solution displaying clear evidence of attention to the problem, but some errors are present.
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> **C:** Work that satisfies 2 of the following: incomplete solution, lack of conceptual understanding, or not well thought out.
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> **D:** Numerically and conceptually incorrect, and lacking a thoughtful attempt.
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> **NC:** No credit.

Homework in this class is important. It is the only means students have to exercise their grasp of concepts and skill using mathematical techniques. That's why it's worth 1/3 of your grade. Take it seriously and resolve to spend considerable time on it well ahead of the due date. Evidence of copying between students will result in no credit for that assignment for all involved – regardless of who actually "worked" the problem(s). Note that I do not object to students studying together; I do object to plagiarism. Indicate on your homework any students you collaborated with and explain the degree of their contribution to your work.

There will also be quizzes, both announced and unannounced, at the beginning of class periodically throughout the quarter. These quizzes will generally be "easy" if you are keeping up with lecture, assigned reading, homework, labs, etc. If you know beforehand that you are going to miss class, let me know! Please note that this does not mean you will be *automatically* excused simply because you let me know you won't be there, but if you miss a quiz due to an unexcused/unexpected absence you will absolutely receive a **NC**.

Examinations: There will be a midterm and a comprehensive final exam.

Evaluation: Letter grades will be assigned for all work. Averaging will follow the usual 4.0 scale to determine a final grade point and associated letter grades.

Homework & quizzes: 1/3
Midterm: 1/3 (tentatively Tuesday, July 24)
Final: 1/3 (Thursday, Aug. 30th)

Add/Drop/Withdraw Deadlines:
Drop: Monday, July 9
Withdraw: Friday, July 27

Neither Summer Session nor instructors drop students for non-attendance or non-payment. Students must drop themselves. Dropping results in full tuition reversal/refund. Withdraw posts a W for the grade and full tuition is charged (no refund).

For all dates and deadlines, including 'change of grade option' (P/NP) and grades due, here is the summer academic calendar - https://summer.ucsc.edu/fundamentals/academic-calendar.html

DRC Accommodations:
The Disability Resources Center reduces barriers to inclusion and full participation for students with disabilities by providing support to individually determine reasonable academic accommodations. If you have questions or concerns about exam accommodations, or any other disability-related matter, please contact the DRC office, located in Hahn 125 or at 831-459-2089 or drc@ucsc.edu.

Academic Dishonesty
Academic integrity is the cornerstone of a university education. Academic dishonesty diminishes the university as an institution and all members of the university community. It tarnishes the value of a UCSC degree.
All members of the UCSC community have an explicit responsibility to foster an environment of trust, honesty, fairness, respect, and responsibility. All members of the university community are expected to present as their original work only that which is truly their own. All members of the community are expected to report observed instances of cheating, plagiarism, and other forms of academic dishonesty in order to ensure that the integrity of scholarship is valued and preserved at UCSC.
In the event a student is found in violation of the UCSC Academic Integrity policy, he or she may face both academic sanctions imposed by the instructor of record and disciplinary sanctions imposed either by the provost of his or her college or the Academic Tribunal convened to hear the case. Violations of the Academic Integrity policy can result in dismissal from the university and a permanent notation on a student's transcript.
For the full policy and disciplinary procedures on academic dishonesty, students and instructors should refer to the Academic Integrity page at the Division of Undergraduate Education.

Title IX:
The university cherishes the free and open exchange of ideas and enlargement of knowledge. To maintain this freedom and openness requires objectivity, mutual trust, and confidence; it requires the absence of coercion, intimidation, or exploitation. The principal responsibility for maintaining these conditions must rest upon those members of the university community who exercise most authority and leadership: faculty, managers, and supervisors.

The university has therefore instituted a number of measures designed to protect its community from sex discrimination, sexual harassment, sexual violence, and other related prohibited conduct. Information, advice, referrals, and/or copies of the UC Policy on Sexual Violence and Sexual Harassment and the UC Santa Cruz Procedures for Reporting and Responding to Reports of Sexual Violence and Sexual Harassment are available to all students, faculty, and staff by contacting Tracey Tsugawa, Title IX/Sexual Harassment Officer, 105 Kerr Hall, 459-2462, or ttsugawa@ucsc.edu