San José State University
Department of Electrical Engineering
EE122, Electronic Design I, Section 1, Fall, 2018

Course and Contact Information

Instructor:	Prof. Hamedi-Hagh
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Office Hours:	Tuesdays 10:15 to 12:00
Class Days/Time:	Tuesdays/Thursdays 9:00-10:15
Classroom:	ENGR345
Prerequisites:	EE110 and related background in circuit analysis

Course Format

Course Description

This course teaches the operation, modeling and analysis of basic electronic blocks and components such as operational amplifiers (opamps), diodes, metal oxide semiconductor (MOS) transistors. The design and characteristics of analog amplifiers and digital inverters are also studied. The laboratory experiments associated with this course involves circuit simulations using Spice and measurement.

Course Learning Outcomes (CLO)

Fundamental building blocks for Analog integrated circuits, basic physical electronics, electronic devices, and device characteristics. The devices include diodes, field-effect transistors (FET), and operational amplifiers (Opamps). Analysis (DC and small-signal) and circuit design containing diodes, FETs, and opamps.

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

1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
3. An ability to communicate effectively with a range of audiences
4. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.

Required Texts/Readings (Required)

Textbook

The first eight chapters of the following textbook are covered in this course.
Fundamentals of Microelectronics, 2nd Edition, by Behzah Razavi, John Wiley, 2013.

www.wiley.com/college/razavi
Chapter 1: Introduction to Microelectronics
Chapter 8: Operational Amplifiers as a Black Box
Chapter 2: Basic Physics of Semiconductors
Chapter 3: Diode Models and Circuits
Chapter 6: Physics of MOS Transistors
Chapter 7: CMOS Amplifiers

Other Readings

Microelectronic Circuits, 6th Edition, by Sedra and Smith, Oxford University Press, 2010.
www.sedrasmith.org/

Course Requirements and Assignments (Required)

"Success in this course is based on the expectation that students will spend, for each unit of credit, a minimum of 45 hours over the length of the course (normally three hours per unit per week) for instruction, preparation/studying, or course related activities, including but not limited to internships, labs, and clinical practice. Other course structures will have equivalent workload expectations as described in the syllabus."

Problem solution is essential for student's success in this course and the textbook problems are all designed to better prepare students for examinations. Textbook provides answers to some chapter questions. It is highly recommended that students solve as many questions as possible and verify their answers during office hours. A number of projects will be assigned to the students in the laboratory part of this course, where a student will design, simulate, build, and test an electronic circuit, write a final report on the project and give a presentation. For more detail refer to EE124 Laboratory Manual.

Final Examination or Evaluation

Final exam will be comprehensive and will cover all topics taught in the course.

Grading Information (Required)

There will be three quizzes, two midterm exams and a final exam. Exams are closed book. Students are only allowed to bring a calculator. If necessary, one page of formula will be provided to you within your exam sheets. There will be no make-up exams (unless under a very special circumstance and when both written excuse and official proofs are provided). Exam solutions might be provided after each test.

Determination of Grades

Three Quizzes	3×5% (Schedules are set. See the last page of this course syllabus)
Two Midterms	2×15% (Schedules are set. See the last page of this course syllabus)
Final exam	35% (Schedule is set. See the last page of this course syllabus)
Laboratory	20%

Above 90%	A
89% - 85%	A-
84% - 82%	B+
81% - 79%	B
78% - 75%	B-
74% - 72%	C+
71% - 69%	C
68% - 65%	C-

64% - 62% D+
61% - 59% D
58% - 55% D-
below 55% F

Classroom Protocol

The Electrical Engineering Department will enforce the following Honor Code that must be read and accepted by all students.
"I have read the Honor Code and agree with its provisions. My continued enrollment in this course constitutes full acceptance of this code. I will NOT:

- Take an exam in place of someone else, or have someone take an exam in my place
- Give information or receive information from another person during an exam
- Use more reference material during an exam than is allowed by the instructor
- Obtain a copy of an exam prior to the time it is given
- Alter an exam after it has been graded and then return it to the instructor for re-grading
- Leave the exam room without returning the exam to the instructor."

University Policies (Required)

Per University Policy S16-9, university-wide policy information relevant to all courses, such as academic integrity, accommodations, etc. will be available on Office of Graduate and Undergraduate Programs' Syllabus Information web page at http://www.sjsu.edu/gup/syllabusinfo/"

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Tentative Course Schedule

Week	Date	Topics, Readings, Assignments, Deadlines
1	08/21	Introduction
1	08/23	Review of Ohm's and Kirchhoff's Laws
2	08/28	Diode Operation, Biasing and Modeling
2	08/30	Half-Wave Rectifiers
3	09/04	Full-Wave Rectifiers
3	09/06	Zener Diodes and Regulators
4	09/11	Ideal Opamp Applications: Filters, Logarithmic Amplifiers, Buffers
4	09/13	Cramer's Rules and Laplace Determinant Expansion
5	09/18	Analysis of Non-ideal Inverting Opamps (Gain, Node Resistance)
5	09/20	Analysis of Non-ideal Non-inverting Opamps (Gain, Node Resistance)
6	09/25	Zeros and Poles, Bandwidth of Non-ideal Inverting Opamps
6	09/27	Bandwidth of Non-ideal Non-inverting Opamps (Quiz #1)
7	10/02	Midterm #1
7	10/04	Opamp Offset Voltage, Slew-Rate and Settling Time
8	10/09	Comparators, Inverting Hysteresis Circuits
8	10/11	Non-inverting Hysteresis Circuits
9	10/16	Oscillators and Function Generators
9	10/18	MOSFET Operation
10	10/23	MOSFET Biasing and Modeling
10	10/25	NMOS Common Source Amplifiers DC Analysis
11	10/30	PMOS Common Source Amplifiers DC Analysis
11	11/01	NMOS/PMOS Common Source Amplifiers AC Analysis (Quiz #2)
12	11/06	Midterm #2
12	11/08	Variations of Amplifier Biasing Networks
13	11/13	NMOS/PMOS Common Gate Amplifiers DC Analysis
13	11/15	NMOS/PMOS Common Gate Amplifiers AC Analysis
14	11/20	NMOS/PMOS Common Drain Amplifiers DC Analysis
14	11/22	NMOS/PMOS Common Drain Amplifiers AC Analysis
15	11/27	NMOS/PMOS Source Degeneration Amplifiers DC Analysis
15	11/29	NMOS/PMOS Source Degeneration Amplifiers AC Analysis (Quiz #3)
16	12/04	Digital Gates (optional topic)
16	12/06	Course Review
Final Exam	12/13	7:15 AM to 9:30 AM in ENGR 345