

San José State University
Department of Aviation & Technology
Tech-62, Analog Circuits, Section 1, Spring 2018

Course and Contact Information

Instructor:	Dr. Mostafa Mortezaie
Office Location:	IS216
Telephone:	(408) 306-1919
Email:	mostafamortezaie@yahoo.com, and CANVAS (preferred)
Office Hours:	Tuesday: 14:30-15:00 & Thursday: 15:50 to 16:20 (IS126)
Class Days/Time:	Tu/Th: 15:00-15:50
Classroom:	IS126
Prerequisites:	TECH-60 and MATH-071 or MATH-030

Course Format:

The course relies on lecture materials presented in class and students are strongly encouraged to attend.

Faculty Web Page and MYSJSU Messaging

Course materials such as syllabus, handouts, notes, assignment instructions, etc. can be found on [Canvas Learning Management System course login website](http://sjsu.instructure.com) at <http://sjsu.instructure.com>. You are responsible for regularly checking with the messaging system through [MySJSU](http://my.sjsu.edu) at <http://my.sjsu.edu> (or other communication system as indicated by the instructor) to learn of any updates

Course Description

Semiconductor theory; p-n junction, bipolar transistors, JFETs and MOSFETs, optoelectronic devices. Operational amplifiers and 555 timers. Device applications: comparators, signal generators, active filters, instrumentation amplifiers, voltage regulators and power supplies. Course Learning Outcomes (CLO)

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

1. Describe the fundamentals of semiconductor diodes, transistors, op-amps, timers, and oscillators.
2. Build, identify, and analyze diode circuits, transistor circuits, op-amp circuits, active filters, and oscillators.
3. Design or modify fundamental electronic circuits to meet certain requirements

Required Texts/Readings

Textbook

Floyd, Thomas L. (2012). Electronic Devices. Conventional Current Version. 10th Ed. Upper Saddle River, NJ: Prentice Hall. ISBN-13: 978-0-13-441454-6.

You may obtain an electronic version at:

<http://www.mypearsonstore.com/bookstore/electronic-devices-conventional-current-version-subscription-9780134414546?xid=PSED>

Other Readings

Instructor lecture notes and datasheets.

For LTspice Exercises, download from the Link:

[https://media.pearsoncmg.com/ph/chet/careersresources/resourcessite/products/series.html#series,series=Electronics and Electricity Technology](https://media.pearsoncmg.com/ph/chet/careersresources/resourcessite/products/series.html#series,series=Electronics%20and%20Electricity%20Technology)

Course Requirements and Assignments

Class Participation

Students working in groups of 2-3 will solve Problems Sets (assigned problems from each chapter) posted on Canvas (<https://sjsu.instructure.com>). Click on the **Modules** tab. You need to include the question and the answer. The answers should be easy to follow. The whole class will check/discuss if the answers are correct before submitting them. This group discussion will reinforce and/or enhance your analog circuits' knowledge.

Class Participation contributes to CLOs 2 and 3, learning the fundamental concepts of analog circuits, developing teamwork skills and discussing the course material. Class Participation is based on in class assignment or instructor observation of students' participation and presence in the class. Classes missed without approved reason and not made up will deduct from this score.

Lab experiments

You will complete lab assignments individually using the SPICE software. In addition, you will hardwire 4 lab experiments and will compare the measurements obtained using laboratory measuring instruments with the simulation results obtained using SPICE. The written reports will be submitted one week after the date of the assigned lab. Lab experiments contribute to CLOs 2, 4 and 5, reinforcing the course material and developing teamwork skills.

Tests

You will be assigned quizzes on a regular intervals as indicated in the syllabus, two midterms and a final exam. Tests will start and end at the scheduled time. These tests contribute to CLOs 1, 2 and 3 as well as reinforcing the learning of the fundamental concepts of analog circuits.

Final Examination

Final Exam will be administered in class on Thursday, May 17, 2018, 2:45 PM to 5:00 PM.

Grading Information

Weekly online Quizzes, midterms, and final exam will be graded based on work shown and accurate answers. Class Participation is based on in-class assignments or instructor observation of students' participation as well as class presence. Lab experiments grade will be determined by the percent of lab assignments completed on or before the due date.

Determination of Grades

Grades will be determined based on your performance in Lab experiments, Class Participation, Weekly Quizzes, Midterms, homework, and Final Exam. The final grade for the course will be based on the following items and weights:

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|-------------------------------|---|
| 1. Lab experiments | 30% |
| 2. Class participation online | 5% |
| 3. Homework Assignments | 10% |
| 4. Weekly Quizzes | 15% |
| 5. Midterms (2x10%) | 20% (Midterm 1: March 6 th , and Midterm 2 : April 5 th) |
| 6. Final Exam | 20% (Final Exam: May 17 th) |

There will be no curve for grading. Final grades will be assigned as follows:

A	>94	A-	90-93		
B+	85-89	B	80-84	B-	76-79
C+	72-75	C	69-71	C-	65-68
D+	62-64	D	59-61	D-	56-58
F	<55				

Classroom Protocol

1. You are expected to attend all meetings for the course as you are responsible for material covered in the syllabus. Active participation is essential to ensure maximum benefit for all students. Attendance is fundamental to course objectives; for example, you may be required to interact with others in the class.
2. Download (DO NOT print) read and bring softcopies of the assigned Chapter handout posted on Canvas (<https://sjsu.instructure.com>). Click on the **Modules** tab.
3. You will study the assigned chapter/material before coming to lecture by watching the assigned videos, reading the textbook and reviewing the PowerPoint presentation posted on Canvas (<https://sjsu.instructure.com>). Click on the **Modules** tab.
4. After reviewing the chapter materials you will answer the Problem Sets (assigned problems at the end of the chapter) posted on Canvas (<https://sjsu.instructure.com>). Click on the **Modules** tab.
5. Instructor will explain key points and answer questions from students. Instructor may add related material to enrich the course content.
6. Instructor will become more of a facilitator of the learning process. This means that the instructor will provide as much individual or group assistance as needed.
7. Students should work and learn in teams. This is very important to be successful in the real world.

University Policies

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/>"

Tech 62 Analog Circuits, Fall 2017 Course Schedule

The schedule is subject to change with one week notice on CANVAS and email.

Course Schedule

Week	Date	Topics, Readings, Assignments, Deadlines
1	JAN 25	Introduction/Orientation/Greensheet Proof of completion of course prerequisite (Tech 60 or equivalent and MATH 71 or MATH 30) Read Ch1: Introduction to Electronics
2	JAN 30 & FEB 1	Chapter 2: Diodes Watch video: http://www.youtube.com/watch?v=1A6V205VMYy Read 1-4: The PN junction Read 2-1: Diode Operation Read 2-3: Diode Models LOAD LTSPICE: Set up for LAB
3	FEB 6 & FEB 8	Chapter 2 Continue Watch video: http://www.youtube.com/watch?v=yj4uVVV5Nsg Read 2-4: Half-Wave Rectifiers Read 2-5: Full-Wave Rectifiers Problems Set 1 Quiz 1
4	FEB 13 & FEB 15	Download (DO NOT print) read and bring softcopies of Chapter 4 Modules tab. Watch video: http://www.youtube.com/watch?v=-td7YT-Pums&feature=related Read Chapter 4: 4-1: BJT Structure 4-2: Basic BJT Operation 4-3: BJT Characteristics And Parameters Problems Set 2 Quiz 2
5	FEB 20 & FEB 22	Chapter 4 Continue 4-4: The BJT As An Amplifier 4-5: The BJT As A Switch Problems Set 3 Quiz 3
6	FEB 27 & MAR 1	Chapter 4-5 Watch video: https://www.youtube.com/watch?v=WLYc6oD2BYA Read: 5-1: The DC Operating Point 5-2: Voltage Divider Bias 5-3: Emitter, Base, Emitter-Feedback And Collector-Feedback Biasing Problems Set 4 Quiz 4

Week	Date	Topics, Readings, Assignments, Deadlines
7	MAR 6 & MAR 8	Review Chapter 5 Download (DO NOT print) read and bring softcopies of Chapter 6 handout 2017 from Canvas. Modules tab. Read 6-1: Amplifier Operation Watch video: http://www.youtube.com/watch?v=-LPALAwcYkg Read 6-2: Transistor AC Models Watch video: https://www.youtube.com/watch?v=Pkjin18Ekjic Read 6-3: The Common-Emitter Amplifier Read 6-4: The Common-Collector Amplifier Problems Set 5 Quiz 5 MIDTERM 1 (March 6th)
8	MAR 13 & MAR 15	Discuss Chapter 6 Read and bring Chapter 6 handout 2017 from Canvas. Modules tab. Read in advance for the next session: 6-5: The Common-Base Amplifier 6-6: Multistage Amplifiers Problems Set 6 Quiz 6
9	MAR 20 & MAR 22	Discuss Chapter 6 Prepare in advance for the next session: Read 8-1: The JFET Watch video: http://www.youtube.com/watch?v=BzsXNhigVC0 Read 8-2: JFET Characteristic and Parameters Read 8-3: JFET Biasing Read 8-4: The Ohmic Region Problems Set 7 Quiz 7
10	MAR 27 & MAR 29	Spring Break
11	APR 3 & APR 5	Chapter 9 Read 9-1: The Common-Source Amplifier Read 9-2: The Common-Drain Amplifier Read 9-3: The Common-Gate Amplifier Problems Set 8 Quiz 8 Midterm 2 (April 5th)
12	APR 10 & APR 12	Prepare in advance for the next session: Download (DO NOT print) read and bring softcopies of Chapter 3 Read 2-6: Power Supply Filters and Regulators Read Ch3: Special-Purpose Diodes Watch video: http://www.youtube.com/watch?v=jG2YAfTWxvc Read 3-1: The Zener Diode Read 3-2: Zener Diode Application

Week	Date	Topics, Readings, Assignments, Deadlines
13	APR 17 & APR 19	Watch video: http://www.youtube.com/watch?v=TQB1VILBgJE Read 12-4: Op-Amps with Negative Feedback Read 12-5: Effects of Negative Feedback on Op-Amp Impedance Read 12-7: Open-Loop Response Read 12-8: Closed-Loop Response Problems Set 9 Quiz 9
14	APR 24 & APR 26	Discuss Chapter 12 <i>Prepare in advance for the next session:</i> Watch video: http://www.youtube.com/watch?v=nG8gA_kAp-Y Read 13-1: Comparators Read 13-2: Summing Amplifiers Read 13-3: Integrators and Differentiators Problems Set 10 Quiz 10
15	MAY 1 & MAY 3	Chapter 16 Read 16-2: Feedback Oscillator Principles and Oscillator types. Read 16-3 to 16-5 Read 16-6: 555 Timer.
16	MAY 8 & MAY 10	Review All material Prepare for FINAL
Final Exam	MAY 17	Location: IS216 Time: 12:15-14:30

SAN JOSE STATE UNIVERSITY
Department of Aviation & Technology

Tech-62 Lab, IS117

Lab Section 1: Thursday, 12:00 PM to 2:45 PM

TA: Jui Modi, juidarshankumar.modi@sjsu.edu

Lab Section 2: Thursday, 4:30 PM to 7:15 PM

TA: Ravi Shah, ravisanjaybhai.shah@sjsu.edu

ISA: Jui Modi, juidarshankumar.modi@sjsu.edu

Your Weekly Assignment (dates subject to revision)	Lab Experiments
1	Hands On, Lab Safety and Rules by TAs. SPICE Introduction.
1&2	SPICE Bipolar Transistor characteristics. Refer Experiment #11
1&2	SPICE Collector-feedback biased BJT. Refer Experiment #16
2&3	#1 Hardwired lab Experiment Collector-feedback biased BJT (2N3904 or equivalent) BONUS: Bipolar Transistor characteristics
3&4	SPICE Voltage Divider Biased BJT. Refer Experiment #13
4&5	#2 Hardwired Lab Experiment Voltage Divider Biased BJT
6	SPICE Small-signal common-emitter amplifier. Refer Experiment #17
6&7	#3 Hardwired Lab Experiment Small-signal common-emitter amplifier
8	SPICE JFET Small-signal common-source amplifier. Refer Experiment #27
8&9	SPICE OPAMP Inverting voltage amplifier. Refer Experiment #32 SPICE OPAMP Non Inverting voltage amplifier. Refer Experiment #31
10	
10&11	#4 Hardwired Lab Experiment Inverting Voltage Amplifier
12	
13/12	SPICE Op-amp Integrator and Differentiator. Refer Experiment #35.
14/13	Catch up BONUS: Hardwire Op-amp Integrator or Differentiator

Notes:

1. Each student will perform all lab experiments using SPICE: Simulation Program with Integrated Circuit Emphasis (LTspice/Multisim software).
2. Each student will submit an online lab report a week after the lab is completed.
3. Students working in groups of 2-3 members will hardwire four lab experiments. The measurements obtained in these hardwired lab experiments will be compared with the simulation results using SPICE.
4. While one group of students work at the Computer Area other group will work on the instrument test bench area. Simulation and Hardwiring may be repeated in any order.
5. Each team will submit a report online of each hardwired lab within a week after the lab is completed.
6. Experiment is complete when the report is complete and accepted. If you have finished the Lab data collection you may spend the rest of the time in Lab to complete the report and submit online.