

**San José State University**  
**Department of Aviation & Technology**  
**Tech 62, Analog Circuits, Section 2, Fall 2018**

**Course and Contact Information**

<b>Instructor:</b>	Dr. Mostafa Mortezaie
<b>Office Location:</b>	EIS216
<b>Telephone:</b>	(408) 306-1919
<b>Email:</b>	<a href="mailto:Mostafa.mortezaie@sjsu.edu">Mostafa.mortezaie@sjsu.edu</a> , and CANVAS
<b>Office Hours:</b>	T/Th: 15:50 to 16:50
<b>Class Days/Time:</b>	T/Th: 15:00-15:50
<b>Classroom:</b>	IS216
<b>Prerequisites:</b>	TECH 060 and MATH 071 or MATH 030

**Course Format:**

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

**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:

## Course Requirements and Assignments

### Class Participation

Homework assignments can be found posted on Canvas (<https://sjsu.instructure.com>). Click on the **Modules** tab. You need to include the question and the answer using MS-Word document. The answers should be easy to follow.

Class Participation contributes to CLOs 2 and 3, learning the fundamental concepts of analog circuits, developing teamwork skills and discussing the course material.

### Lab experiments

You will complete lab assignments individually using the SPICE software. In addition, you will hardware 4 lab experiments and will compare the measurements obtained using real instruments with the ones 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 take weekly take-home quizzes, two midterms and the 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 or Evaluation

Final Exam will be as shown below:

Monday, December 17	1445-1700
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### Grading Information

Weekly online Quizzes, midterms and final exam will be graded based on the followed process and accurate answers. Class Participation will be evaluated based on the followed process and percent of accurate responses provided. Lab experiments grade will be determined on 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 and Final Exam. The final grade for the course will be based on the following items and weights:

- |                               |   |
|-------------------------------|---|
| 1. Lab experiments            | 30%   |
| 2. Class participation online | 5%  |
| 3. Homework Assignments       | 10%   |
| 4. Weekly Quizzes             | 15%   |
| 5. Midterms (2x10%)           | 20% (Midterm 1: October 4 <sup>th</sup> and Midterm 2 : Nov 1 <sup>st</sup> ) |
| 6. Final Exam                 | 20% (Final Exam: December 17, 2018)   |

There will be no curving of grades. Final grades will be assigned as follows:

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Grading Scheme		
Name:	Range:	
A	100 %	to 94.0%
A-	< 94.0 %	to 90.0%
B+	< 90.0 %	to 87.0%
B	< 87.0 %	to 84.0%
B-	< 84.0 %	to 80.0%
C+	< 80.0 %	to 77.0%
C	< 77.0 %	to 74.0%
C-	< 74.0 %	to 70.0%
D+	< 70.0 %	to 67.0%
D	< 67.0 %	to 64.0%
D-	< 64.0 %	to 61.0%
F	< 61.0 %	to 0.0%

### University Policies

Per University Policy S16-9, Office of Graduate and Undergraduate Programs maintains university-wide policy information relevant to all courses, such as academic integrity, accommodations, etc. will be available on Office of Graduate and Undergraduate Programs' (GUP) Syllabus Information web page at:

<http://www.sjsu.edu/gup/syllabusinfo/>

# Tech 62 Analog Circuits, Fall 2018 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	Aug 21, 23	<p>Introduction/Orientation/Greensheet  <b>Email Proof of completion of course prereq (Tech 60 or equivalent and MATH 71 or MATH 30) by 8/29</b>  <b>Read</b> Ch1: Introduction to Electronics/ Ch 2: Diodes  <b>Watch</b> video: <a href="http://www.youtube.com/watch?v=1A6V205VMY">http://www.youtube.com/watch?v=1A6V205VMY</a>                      1-4: The PN junction                      2-1: Diode Operation                      2-3: Diode Models                      LOAD LTSPICE: Set up for LAB  <b>Prepare in advance for the next session:</b>  <b>Watch</b> video: <a href="http://www.youtube.com/watch?v=-td7YT-Pums&amp;feature=related">http://www.youtube.com/watch?v=-td7YT-Pums&amp;feature=related</a>  <b>Read</b> Chapter 4  <b>Answer Problems Set 1</b></p>
2	Aug 28, 30	<p>Lecture: Chapter 4                      4-1: BJT Structure                      4-2: Basic BJT Operation                      4-3: BJT Characteristics And Parameters</p> <p>Email Proof of completion of course prereq (Tech 60 or equivalent and MATH 71 or MATH 30) by 8/30                      4-4: The BJT As An Amplifier                      4-5: The BJT As A Switch                      Prepare Quiz Set1                      • Submit Weekly Quiz 1 via Canvas when available                      Attempt Assignment Set 1                      Prepare in advance for the next session:                      Watch video: <a href="https://www.youtube.com/watch?v=WLYc6oD2BYA">https://www.youtube.com/watch?v=WLYc6oD2BYA</a>                      Read: Chapter 5                      Finish Assignment Set 1</p>
3	Sep 4, 6	<p>Lecture: Chapter 5                      5-1: The DC Operating Point                      5-2: Voltage Divider Bias                      5-3: Emitter, Base, Emitter-Feedback And Collector-Feedback Biasing</p> <p><b>Finish Problems Set 2</b>  <b>Submit</b> Weekly Quiz 2 via Canvas. Click on the <b>Assignments</b> tab.  <b>Prepare in advance for the next session:</b> Read Chapter 6  <b>Watch</b>                      video: <a href="https://www.youtube.com/watch?v=Pkjn18Ekjic">https://www.youtube.com/watch?v=Pkjn18Ekjic</a>  <b>Read</b> 6-3: The Common-Emitter Amplifier  <b>Read</b> 6-4: The Common-Collector Amplifier  <b>Answer Problems Set 3</b></p>

Week	Date	Topics, Readings, Assignments, Deadlines
4,5	Sep 11, 13, 18, 20	<p>Lecture: Chapter 6  <b>Read</b> 6-1: Amplifier Operation  <b>Watch</b> video: <a href="http://www.youtube.com/watch?v=-LPALAwcYkg">http://www.youtube.com/watch?v=-LPALAwcYkg</a>  <b>Read</b> 6-2: Transistor AC Models</p> <p><b>Finish Problems Set 3</b>  <b>Submit Problems Set 2</b> via Canvas. Click on the <b>Assignments</b> tab.  <b>Submit</b> Weekly Quiz 3 via Canvas. Click on the <b>Assignments</b> tab.</p> <p><b>Read in advance for the next session:</b>  Chapter 6  <b>Answer Problems Set 4</b></p>
6	Sep 25, 27	<p>Lecture: Chapter 6  6-5: The Common-Base Amplifier  6-6: Multistage Amplifiers</p> <p><b>Finish Problems Set 4</b>  <b>Submit Problems Set 3</b> via Canvas, Click on the <b>Assignments</b> tab.  <b>Submit</b> Weekly Quiz 4 via Canvas.) Click on the <b>Assignments</b> tab.</p> <p><b>Prepare in advance for the next session:</b>  <b>Answer Problems Set 5</b>  <b>Read in advance for the next session:</b>  Chapter 8  <b>Watch</b> video: <a href="http://www.youtube.com/watch?v=BzsXNhgVC0">http://www.youtube.com/watch?v=BzsXNhgVC0</a>  <b>Prepare for Midterm 1</b></p>
7	Oct 2, 4	<p><b>Midterm 1, Oct 4</b>  Lecture: Chapter 8  8-1: The JFET  8-2: JFET Characteristic and Parameters  8-3: JFET Biasing  8-4: The Ohmic Region</p> <p><b>Finish Problems Set 5</b>  <b>Submit Problems Set 4</b> via Canvas. Click on the <b>Assignments</b> tab.  <b>Submit</b> Weekly Quiz 5 via Canvas. Click on the <b>Assignments</b> tab.</p>
8	Oct 9, 11	Review Q & A
9	Oct 16, 18	<p><b>Lecture: Chapter 9</b>  <b>Read</b> 9-1: The Common-Source Amplifier  <b>Read</b> 9-2: The Common-Drain Amplifier  <b>Read</b> 9-3: The Common-Gate Amplifier</p> <p><b>Answer Problems Set 6</b></p>

Week	Date	Topics, Readings, Assignments, Deadlines
10	Oct 23, 25	<p>Discuss Chapter 10  <b>Finish Problems Set 7</b>  <b>Submit Problems Set 6</b>  <b>Submit Weekly Quiz 7</b>  <i>Prepare in advance for the next session:</i>  <b>Watch</b> video: <a href="http://www.youtube.com/watch?v=TQB1VILBgJE">http://www.youtube.com/watch?v=TQB1VILBgJE</a>  <b>Answer Problems Set 8</b></p>
11	Oct 30, Nov 1	<p><b>Midterm 2, Nov 1</b>  Lecture: Chapter 12  12-4: Op-Amps with Negative Feedback  12-5: Effects of Negative Feedback on Op-Amp Impedance  12-7: Open-Loop Response  12-8: Closed-Loop Response</p> <p><b>Finish Problems Set 8</b>  <b>Submit Problems Set 7</b> via Canvas. Click on the <b>Assignments</b> tab.  <b>Submit Weekly Quiz 8</b> via Canvas. Click on the <b>Assignments</b> tab.</p> <p><i>Prepare in advance for the next session:</i>  <b>Answer Problems Set 9</b></p> <p><b>Watch</b> video: <a href="http://www.youtube.com/watch?v=nG8gA_kAp-Y">http://www.youtube.com/watch?v=nG8gA_kAp-Y</a></p>
12,13	Nov 6, 8, 13, 15	<p>Lecture: Chapters 13 &amp; 16  13-1: Comparators  13-2: Summing Amplifiers  13-3: Integrators and Differentiators  16-2: Feedback Oscillator Principles and Oscillator types  13-3: Integrators and Differentiators  16-2: Feedback Oscillator Principles and Oscillator types</p> <p><b>Finish Problems Set 9</b>  <b>Submit Problems Set 8</b> via Canvas. Click on the <b>Assignments</b> tab.  <b>Submit Weekly Quiz 9</b> via Canvas. Click on the <b>Assignments</b> tab.</p> <p><i>Prepare in advance for the next session:</i>  <b>Watch</b> video: <a href="http://www.youtube.com/watch?v=yj4uVVV5Nsg">http://www.youtube.com/watch?v=yj4uVVV5Nsg</a>  <b>Answer Problems Set 10</b></p>
14	Nov 20, 22 Thanks Giving Nov 22	<p><b>Lecture:</b> Chapter 2  <b>Read 2-4:</b> Half-Wave Rectifiers  <b>Read 2-5:</b> Full-Wave Rectifiers  Review Q &amp; A  <b>Finish Problems Set 10</b>  <b>Submit Problems Set 9</b> via Canvas. Click on the <b>Assignments</b> tab.  <b>Submit Weekly Quiz 10</b> via Canvas. Click on the <b>Assignments</b> tab. <b>Due by 11:00 pm on 11/29! Individual submission</b></p>

Week	Date	Topics, Readings, Assignments, Deadlines		
15	Nov 27, 29	<p><i>Prepare in advance for the next session:</i></p> <p><b>Lecture:</b> Chapter 2 2-6: Power Supply Filters and Regulators</p> <p><b>Read</b> Ch3: Special-Purpose Diodes</p> <p><b>Watch</b> video: <a href="http://www.youtube.com/watch?v=jG2YAtTWxvc">http://www.youtube.com/watch?v=jG2YAtTWxvc</a></p> <p><b>Read</b> 3-1: The Zener Diode</p> <p><b>Read</b> 3-2: Zener Diode Application</p> <p><b>Answer Problems Set 11</b></p>		
16	Dec 4, 6	<p>Review All material</p> <p><b>Submit Problems Set 10</b> via Canvas. Click on the <b>Assignments</b> tab.</p> <p><b>Submit Problems Set 11</b> via Canvas. Click on the <b>Assignments</b> tab.</p> <p><b>Prepare for FINAL</b></p>		
<b>Final Exam</b>	<b>Monday, Dec17, 2018</b>	<p><b>Venue: IS216</b></p> <table border="1" data-bbox="418 709 878 751"> <tr> <td data-bbox="418 709 727 751">Monday, December 17</td> <td data-bbox="727 709 878 751">1445-1700</td> </tr> </table>	Monday, December 17	1445-1700
Monday, December 17	1445-1700			

SAN JOSE STATE UNIVERSITY  
Department of Aviation & Technology

Tech 62 Labs @ IS117  
Fall 2018  
Section TBD

Office Hour: TBD

TAs: [juidarshankumar.modi@sjsu.edu](mailto:juidarshankumar.modi@sjsu.edu)

Week (dates subject to revision)	Lab Experiments
<b>1</b>	Hands On, Lab Safety and Rules by TAs. SPICE Introduction.
<b>1&amp;2</b>	<b>SPICE</b> Bipolar Transistor characteristics. Refer Experiment #11
<b>1&amp;2</b>	SPICE Collector-feedback biased BJT. Refer Experiment #16
<b>2&amp;3</b>	<b>#1 Hardwired lab Experiment</b> Collector-feedback biased BJT (2N3904 or equivalent) BONUS: Bipolar Transistor characteristics
<b>3&amp;4</b>	<b>SPICE</b> Voltage Divider Biased BJT. Refer Experiment #13
<b>4&amp;5</b>	<b>#2 Hardwired Lab Experiment</b> Voltage Divider Biased BJT
<b>6</b>	<b>SPICE</b> Small-signal common-emitter amplifier. Refer Experiment #17
<b>6&amp;7</b>	<b>#3 Hardwired Lab Experiment</b> Small-signal common-emitter amplifier
<b>8</b>	<b>SPICE</b> JFET Small-signal common-source amplifier. Refer Experiment #27
<b>8&amp;9</b>	<b>SPICE</b> OPAMP Inverting voltage amplifier. Refer Experiment #32 <b>SPICE</b> OPAMP Non Inverting voltage amplifier. Refer Experiment #31
<b>10</b>	catch up
<b>11</b>	<b>#4 Hardwired Lab Experiment</b> Inverting Voltage Amplifier
<b>14</b>	<b>Thanksgiving Holidays – Campus Closed (Thursday through Friday)</b>
<b>15</b>	<b>SPICE</b> Op-amp Integrator and Differentiator. Refer Experiment #35.
<b>16</b>	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 ones obtained using SPICE.
4. While one batch of students work at the Computer Area other half will work on the instrument test benches area. Simulation and Hardwiring may be repeated in any order.
5. Each group will submit a report online of each hardwired lab within week after the lab is completed.
6. Experiment is complete when 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.