San José State University
Aviation and Technology Department
TECH 169 Applied Electronic Design, Spring 2018

Course and Contact Information

Instructor	Foroozan Koushan
Office Location	IS 117 – W&F after lab hours
Email address:	foroozan.koushan@sjsu.edu
Office Hours	By appointment, before or after lab session
Class Days/Time	Lecture: M 18:00 – 19:45; Lab: W&F 18:00 – 20:45
Classroom	lecture: IS 216; Lab: IS 117
Prerequisites	TECH 167

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

Required Text/Readings

Required Text Book: 'Applied Electronics Design', by: D. Joseph Stadtmiller

Recommended Readings: Students are recommended to review the textbooks from previous electronics courses, do library/Internet research, participate actively in class, attend lectures and take notes.

Course Materials
Copies of the course materials including the syllabi will be available in Canvas

Course Description
Design, test, analysis, simulation, development and implementation of electronic systems for control of industrial processes using project management techniques and team work. Hardware, software, and system interfacing.

Course Learning Outcomes

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

1. Design a prototype system for controls of industrial processes
2. Apply digital and analog interfacing techniques with a microcomputer system
3. Apply problem-solving techniques in a senior project
4. Discuss system design issues, problems, and trends
5. Analyze, & Solve assigned design problems; test the solution using computer simulation and/or hard-wiring
6. Use an EE Board and a laptop to build, measure, test, troubleshoot and modify design problems.
7. Each student will develop his/her own strategies to design electronic circuits according to the desired specifications. This way, students will quickly find out his/ her weakness that they might have in their knowledge about basic electronics, analog & digital circuits and systems, and microprocessors fundamentals.
8. Students will test their design problems using Multisim, in groups of 2.
9. Students will also use Multisim to help to design, build, test and troubleshoot an electronic system to a given specification.

Methodology

To achieve an effective teaching/learning outcome the following methodology will be used:

a. Students will work in groups to provide the solution or solutions to all proposed Design Problems.

b. Be prepared to participate in Group Discussion. This group discussion will reinforce and/or enhance your technical knowledge with current and relevant information.

c. Since students learn at different pace, have different technical background, remember some of the concepts learned in previous classes, have certain difficulty in applying different concepts from different courses. This is the opportunity to fill out any gaps about basic electronics, analog & digital circuits and systems, and microprocessors fundamentals.

d. Instructor will explain key points and answer questions from students. Instructor may add related material to enrich the course content. The instructor will also review materials that s/he knows her/his students do not fully understand before a design problem is assigned.

e. Instructor will become more as a facilitator of learning. This means that the instructor will provide as much individual or group assistance as needed.

f. Students should work and learn in teams. This is very important in order to be successful in the real world.

Class Protocol

Class participation and attendance are strongly encouraged. Use of cell-phones are not allowed. Laptop computers and tablet are allowed only for taking lecture notes

HW assignments

a. There are no official HW problems assigned to students

b. But all needed materials and solutions to problems offered in the text book are available online. Students are strongly recommended to study and work on these problems

Quiz

a. Total of 4 quizzes spread throughout the semester will be given to the students, at the end of the lecture hours

b. These tests are not comprehensive, and each cover only new materials

c. On the following lecture after quiz, class will go through the review of questions and answers

d. Quiz dates are fixed & pre-selected, so students could plan accordingly - **there won't be any make-up for missed quizzes**

Examinations:

- 1 comprehensive Midterm, and one comprehensive final examination
- Dates for these tests are pre-assigned
- There will be no make-ups for missed exams, except for medical or other reasons outside the student's control, and such must be documented with a written notice.

Lab

Lab Experiments and instructions will be assigned weekly – total of 6 lab experiments will be assigned throughout the semester.

Grading Information

Course grade will be based on homework assignments, midterms, project & final exam.

Lab	18%	Total of 6 experiments
Project	20%	
Midterm	17%	03/19/2018 during lecture hours
4 Quizzes	20%	
Final	25%	05/21/2018 @ 5:15pm

Determination of Grades
There will be no curving of grades. 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				

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/**"**

Term Project

Students will select a project that is challenging, allows them to learn new concepts, and improves upon their troubleshooting skills. The project must be finished by **April 23**. Last 3 sessions of lab will be dedicated to project presentations.

Find your teammate, & submit your proposed project by the end of **Feb 12** Lab session. You must meet this initial dead line. Once your project has been submitted and approved by the instructor, it cannot be changed. **Students can work in groups of 2, for term project**.

No two groups can work on similar projects. So try to be the first to select what you would like to work on, before the topic is taken by other groups!

You are entirely responsible for the completion of the project – Understanding the concept and circuit, circuit design, schematic, assemble, test, troubleshoot, debug, and repair. It is strongly recommended that you establish a time table for the completion of the project.

Keep a log of all your works, e.g. revision(s) of the circuit design and/or software programs, problems encountered, different design and assembly techniques, etc.

The following evaluation criteria will be used:

a) Full understanding of the circuit
b) Meet its specifications and requirements
c) Completeness
d) Quality
e) Functional
f) Appearance
g) Presentation
h) Effort

Project Progress
Students will have the opportunity to work on the term project during the lab, get any assistance from the class members and the instructor to ensure that the project will be completed within the allotted time. After initial understanding of the circuitry involved in the project, students need to use Software simulation to demonstrate the functionality of the circuit before starting to work on a board

Written Report
The term project written report should include, but not limited to, the following items:

a) Introduction
b) Circuit Analysis
c) Procedure – how to test your circuit or system
    1) Hardware
    2) Software
d) Problems Encountered/Troubleshooting/Debugging
d) Conclusions
e) Appendix
  1) Original design schematic
  2) Final version schematic
  3) Parts list
  4) Software programs
  5) References

Tech 169 List of Suggested Projects (not limited) – Use large Bread Boards

1. Design an AM Receiver using discrete components
2. Design an FM Receiver using discrete components
3. Design a D/A converter using discrete components
4. Design a A/D converter using discrete components
5. Design a Three Pole Band pass Filter to given specifications
6. Design an AGC Circuit to show its basic operation
7. Design a Phase Lock Loop Circuit to show its basic operation
8. Design and build a Class C Power Amplifier
9. Design a control system to turn on and off the perimeter house hold lights independent of inside lights
10. Design a 15 V dc power supply with an output current capability of 2 amps.
11. Design a Push-Pull DC to DC converter
12. Design a +5V to +12V switching type setup DC to DC converter

Tech 169 Course outline – Lecture hours**

Mondays		topic	quizzes
1/29/2018	week1	Syllabus/ Introduction	
2/5/2018	week2	Design problem and considerations	
2/12/2018	week3	Component Selection	**quiz#1**
2/19/2018	week4	Diode & Rectifiers	
2/26/2018	week5	Power Supply Design	**quiz#2**
3/5/2018	week6	MOSFET Operation	
3/12/2018	week7	MOSFET as a CAP, RES, & Amplifier	
3/19/2018	week8	**midterm**	
3/26/2018	week9	**spring recess**	
4/2/2018	week10	Review of midterm questions MOSFET amplifiers and current mirrors	
4/9/2018	week11	Passive Filters - LP, HP	
4/16/2018	week12	Power Amplifier Classes	**quiz#3**
4/23/2018	week13	DC Amplifiers	
4/30/2018	week14	AC Amplifiers	
5/7/2018	week15	"	**quiz#4**
5/14/2018	week16	review for final	
5/21/2018	week17	Final @ 5:15pm - 7:30pm	

Final exam schedule: *http://info.sjsu.edu/static/catalog/final-exam-schedule-spring.html*

**** Subject to change with fair notice

Lab Session activities**:

week of		Activities	Reports due @6pm
1/29/2018	week1	group selection - introduction - syllabus	
2/5/2018	week2	**lab1:** characterizing unknown passive elements	
2/12/2018	week3	**lab2:** Clipper Circuits; Clamper Circuit	
2/19/2018	week4	"	lab1 report
2/26/2018	week5	**lab3**: Diodes and Rectifiers	lab2 report
3/5/2018	week6	"	
3/12/2018	week7	**lab4:** Voltage Multipliers	lab3 report
3/19/2018	week8	"	
3/26/2018	week9	**Spring Recess - no lab**	
4/2/2018	week10	**lab5:**NMOS Characterization	lab4 report
4/9/2018	week11	"	
4/16/2018	week12	**lab6:** Common Source and Common Drain Amplifier	lab5 report
4/23/2018	week13	**project presentations**	
4/30/2018	week14		lab6 report
5/7/2018	week15		
5/14/2018	week16	no lab	

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