

San José State University
College of Engineering/Computer Engineering Department
CMPE 110 – Electronics for Embedded Systems

Instructor:	Dr. Ahmet Bindal
Office Location:	ENG 277
Telephone:	(408) 924 - 4195
Email:	ahmet.bindal@sjsu.edu
Office Hours:	Monday 1:30 – 3:00 PM
Class Days/Time:	Monday, Wednesday, 10:30 – 11:20 AM
Lab Days/Time:	Tuesday 1:30 – 4:20 and 4:30 – 7:20 PM
Classroom:	E325
Prerequisite:	EE 101 Students who do not provide documentation of having satisfied the class prerequisite requirements <u>by the second class meeting will be dropped from the class.</u>
Co-requisite:	CmpE 124 Students who do not provide documentation of having satisfied the class co-requisite requirements <u>by the second class meeting will be dropped from the class.</u>

Course Web Page and Messaging

Copies of the course materials such as the syllabus, major assignment handouts, etc. may be found at: <http://www.engr.sjsu.edu/abindal>. You are responsible for regularly checking with the messaging system through MySJSU and the webpage at the link above.

Course Catalog Description

RC, RL and RLC circuit analysis, diodes and diode circuits, MOSFET and bipolar transistor I-V characteristics and circuits, TTL and CMOS logic circuits, CMOS-TTL interface, sensors and signal conditioning circuits using operational amplifiers, A/D and D/A converters, electromechanical device control.

Program Outcomes

- a. Ability to apply knowledge of mathematics, science, and engineering
- b. Ability to design and conduct experiments, as well as to analyze and interpret data
- c. Ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
- d. Ability to function on multi-disciplinary teams
- e. Ability to identify, formulate, and solve engineering problems
- f. Understanding of professional and ethical responsibility
- g. Ability to communicate effectively
- h. Broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
- i. Recognition of the need for, and an ability to engage in life-long learning
- j. Knowledge of contemporary issues
- k. Ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Course Goals and Student Learning Objectives

Course goals

CMPE 110 is an electronics course that introduces Printed Circuit Board (PCB) hardware components running under embedded software.

Success in this course is based on the expectation that students will spend, for each unit of credit, a minimum of forty-five hours over the length of the course (normally 3 hours per unit per week with 1 of the hours used for lecture) for instruction or preparation/studying or course related activities including but not limited to internships, labs, clinical practica. Other course structures will have equivalent workload expectations as described in the syllabus.

Student Learning Objectives

- Analyze RC, RL and RLC circuits and understand their effects on PCB.
- Design circuits with diodes, MOSFETs and bipolar transistors, including open drain and open collector circuits.
- Design TTL and CMOS logic circuits, CMOS-TTL interface.
- Measure electrical characteristics of sensors and design sensor conditioning circuits using operational amplifiers.
- Design A/D and D/A converters and use them in embedded systems.

- Design electromechanical device control circuits.

Required Texts/Readings

Required textbook

A. Bindal “Electronics for Embedded Systems”, Maple Press, ISBN: 978-1-938232-07-7.

Optional textbook:

J. W. Nilsson, S. A. Riedel, “Introductory Circuits for Electrical and Computer Engineering”, Prentice Hall, ISBN: 0-13-019855-2.

Other Material: <http://www.engr.sjsu.edu/abindal/cmpe110.htm>

Hardware Requirements

You will use the Tektronix scopes, function generators and power supplies for the hardware part of your lab assignments. You will need to obtain circuit breadboard, components and probes to conduct your experiments.

Classroom Protocol

You are expected to arrive in time for class. No cell phones and no open laptops are allowed in the lecture. Please be considerate of your fellow students.

Assignments and Grading Policy

Student Assessment

Midterm	30%
Labs	30%
Final Examination	40%

0 to 49	F
50 to 59	D
60 to 69	C
70 to 79	B
80 to 84	B+
85 to 89	A-
90 to 100	A

- **No late assignments will be accepted.** An extension will be granted only if a student has serious and compelling reasons that can be proven by an independent authority (e.g. doctor’s note if the student has been sick).

Descriptions of Assignments/Exams

Exams: Exams will be conducted closed book, comprehensive and will be based on the course material.

Once decided in the class, all exam dates are final. Students may retake a missed exam because of a health emergency or sickness accompanied by an official and signed doctor's report. Each case will be individually verified by calling the doctor's office. The retake exams may have more difficult set of questions than the ones asked in the original exam.

The lab assignments

There will be 7 labs with hardware prototyping on a circuit breadboard. Each lab starts after the delivery of appropriate lecture material:

1. RC, RL (first order) circuits
2. RLC (second order) circuits
3. Diode circuits
4. Bipolar circuits
5. CMOS circuits
6. CMOS-TTL interface
7. Sensor conditioning circuits using operational amplifiers
8. A/D and D/A converters

The organization of the term report will contain the following four sections:

1. Introduction
2. Description of the circuit schematics and components
3. Inclusion of waveforms and results in Excel table
4. Description of the overall learning experience and the difficulties encountered during implementation
5. Conclusions

Policy on Respect and Insubordination

Students who disturb the peace and harmony in class, behave disrespectfully to the instructor or his/her fellow students will be immediately dismissed from the class and reported to student affairs for disciplinary action.

Policy on Cheating

A student or students involved in a cheating incident in a test, homework, report, or lab project will receive an F in the course and will be reported to the judicial affairs office and subjected to disciplinary action.

I will personally notify you of any such findings or actions. All such reports will also be brought to the attention of the Chair of the Computer Engineering department. You have certain rights of appeal, which may serve to exonerate you.

Dropping and Adding

Students who do not provide documentation of having satisfied the class prerequisite and co-requisite requirements (if any) by the second class meeting will be dropped from the class.

Students are responsible for understanding the policies and procedures about add/drop, grade forgiveness, etc. Refer to the current semester's Catalog Policies section at <http://info.sjsu.edu/static/catalog/policies.html>. Add/drop deadlines can be found on the current academic calendar web page located at http://www.sjsu.edu/academic_programs/calendars/academic_calendar/. The Late Drop Policy is available at <http://www.sjsu.edu/aars/policies/latedrops/policy/>. Students should be aware of the current deadlines and penalties for dropping classes.

Information about the latest changes and news is available at the Advising Hub at <http://www.sjsu.edu/advising/>.

University Policies

Academic integrity

Your commitment as a student to learning is evidenced by your enrollment at San Jose State University. The [University's Academic Integrity policy](http://www.sjsu.edu/senate/S07-2.htm), located at <http://www.sjsu.edu/senate/S07-2.htm>, requires you to be honest in all your academic course work. Faculty members are required to report all infractions to the office of Student Conduct and Ethical Development. The [Student Conduct and Ethical Development website](http://www.sjsu.edu/studentconduct/) is available at <http://www.sjsu.edu/studentconduct/>.

Instances of academic dishonesty will not be tolerated. Cheating on exams or plagiarism (presenting the work of another as your own, or the use of another person's ideas without giving proper credit) will result in a failing grade and sanctions by the University. For this class, all assignments are to be completed by the individual student unless otherwise specified. If you would like to include your assignment or any material you have submitted, or plan to submit for another class, please note that SJSU's Academic Policy S07-2 requires approval of instructors.

Campus Policy in Compliance with the American Disabilities Act

If you need course adaptations or accommodations because of a disability, or if you need to make special arrangements in case the building must be evacuated, please make an appointment with me as soon as possible, or see me during office hours. Presidential Directive 97-03 requires that students with disabilities requesting accommodations must register with the DRC (Disability Resource Center) to establish a record of their disability.

Department Policies

- Students who do not provide documentation of having satisfied the class prerequisite or co-requisite requirements (if any) by the second class meeting will be dropped from the class.
- All non-proctored report (or similarly sized) assignments in courses where some of the final grade depends on prose writing will be submitted to Turnitin.com.

Engineering Student Success Center

The Engineering Student Success Center (ESSC) will help you move successfully from freshman to senior year, supporting and enhancing your learning and overall academic experience. ESSC is an inclusive environment that fosters collaboration, builds community and supports your smooth transition into college. It is located in Room 344 in the Engineering Building. The ESSC web site is located at <http://www.engr.sjsu.edu/students/essc>.

Course Schedule

The schedule is tentative and subject to change.

Week	Topics
0	Introduction to class
1	Review of constant coefficient differential equations and Laplace transforms
2	The fundamentals of PCB board Review of the first-order and second order passive networks: RC, RL and RLC circuits
3	Introduction to diodes, diode circuits, Zener diode and Light Emitting Diode (LED)
4	Bipolar transistors and circuits
5	Continue bipolar transistors and circuits
6	Midterm; MOSFET transistors
7	CMOS circuits
8	Continue CMOS circuits
9	CMOS-TTL interface
10	Sensors (temperature, piezoelectric, light etc.) and sensor equivalent circuits
11	Sensor conditioning circuits using operational amplifiers (voltage and trans-impedance amplifiers)
12	Continue on amplifiers
13	A/D and D/A converters
14	Continue A/D and D/A converters Electromechanical device control circuits
15	Continue electromechanical device control circuits
16	FINAL EXAM (comprehensive)