

San José State University
Charles W. Davidson College of Engineering
DEPARTMENT OF ELECTRICAL ENGINEERING
EE 120 – Microprocessor-Based System Design (spring 2017)

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Office Hours: Monday & Wednesday: 12:45 – 1:30
Class Days/Time: Monday & Wednesday, 13:30 – 14:45
Classroom: ENGR 189
Prerequisites: EE 118 (with grade C or better)
EE 120L (to be taken concurrently)
Knowledge in computer programming and software development
Good skills in C/C++ programming
Self-motivation in learning assembly language
Advanced knowledge in number systems and basic logic components

Course Information and Materials

Course information and copies of the course materials such as the syllabus, assignment handouts, etc. can be found on Canvas at [SJSU Academic Technology](#). Students are responsible for updating your email address with SJSU system in order to receive my messages timely.

Catalog Course Description

Advanced algorithmic processes using MSI and SSI integrated circuits. Organization and interface requirements for a microcomputer. Hardware-software tradeoffs in digital systems.

Course Description

This course covers both software and hardware aspects of ARM microcomputer system, including the microprocessor structure, its operation and control, the organization and interface requirements for a microcomputer system, the structures and operations of standard hardware components associated with a microcomputer system, microprocessor and standard buses, assembly language programming and structure of the machine codes. Lab experiments associated with this course involve software/hardware development tools, assembly and C/C++ programming and digital circuit design and testing.

Student Learning Objectives

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

- LO1. Demonstrate an understanding of the microprocessor architecture, its instructions and addressing modes (a, c, l)
- LO2. Analyze a microprocessor program and develop an assembly language programs for applications (a, b, e, l)
- LO3. Demonstrate an understanding of the microprocessor signals, bus cycles and timing (a, b, c)
- LO4. Design a memory system and I/O circuit interface and interface them to a microprocessor (a, c, l)
- LO5. Use programmable interface controllers and programmable timers in a digital circuit (c, i)
- LO6. Design a system using an interrupt interface for a microprocessor (c, i, l)
- LO7. Use development tool for exploring microprocessor architecture, software and hardware development (b, c, k, l)
- LO8. Use logic analyzer for understanding timing, hardware development, and for exploring the relationship between hardware and software of a microprocessor system (b, c, k, l)
- LO9. Analyze experimental data and prepare technical reports and documents (b, g)

Student Outcomes

The letters in parentheses in the student learning objectives refer to ABET criterion 3 Student Outcomes satisfied by the course. These are listed below as a reference:

- (a) An ability to apply knowledge of mathematics, science, and engineering
- (b) An ability to design and conduct experiments, as well as to analyze and interpret data
- (c) An ability to design a system, component, or process to meet desired needs
- (d) An ability to function on multi-disciplinary teams
- (e) An ability to identify, formulate, and solve engineering problems
- (f) An understanding of professional and ethical responsibility
- (g) An ability to communicate effectively
- (h) The broad education necessary to understand the impact of engineering solutions in a global and societal context
- (i) A recognition of the need for, and an ability to engage in life-long learning
- (j) A knowledge of contemporary issues
- (k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice
- (l) Specialization in one or more technical specialties that meet the needs of companies

Required Text and Laboratory Manual

Required Textbooks

- *Embedded Systems with ARM Cortex-M Microcontrollers in Assembly Language*, Yifeng Zhu, Edition: 2, ISBN 0982692633, <http://www.amazon.com/Embedded-Cortex-M-Microcontrollers-Assembly-Language/dp/0982692633/>

Reference Textbooks

- *The Definitive Guide to the ARM Cortex-M3*, Second Edition, Joseph Yiu, Publication Date: December 23, 2009, ISBN-10: 185617963X

(Must be U.S. version. Do NOT use international version)

Laboratory Manual

Laboratory assignments and documents will be distributed and discussed during the lab hours.

Classroom Protocol

EE120 students understand that professional attitude is necessary to maintain a comfortable academic environment in the classroom. For examples:

- Students will put their cell phones in quiet/vibration mode during the lecture.
- Students understand that drinking water, juices, etc. during the lecture is acceptable but NOT eating.
- Students will not skip the lecture and then ask the instructor to summarize the lecture later on. Office hours are for students to have questions, not for the instructor to summarize the lecture for any specific student.
- Students will come to the class on time and leave the class at the end of the lecture.
- Students will consult the course syllabus for class policies and requirements before requesting the instructor for any special considerations and/or exceptions
- To minimize possible tension during the exams, students are requested to follow the exam rules closely.
- Students will work on the project and report by their own and will not share the work with other students
- Students understand that long-term learning is their responsibility and will always keep it up.

If you need to communicate with me, please try to see me in person during the office hours. If you must send me an email, please clearly specify your full-name, course, section, etc. I will not respond to email that I do not know the author or emails that have no manners.

If you need explanations on lecture materials, projects, homework assignments, exams, etc..., please see me in-person during my office hours. Do NOT email me for these matters.

Students are responsible for reading the text, handouts, lecture presentations, etc... and looking for additional reading materials to help them better understand the course topics. Per my personal experience: You will not be able to pass this course if you do not want to read and re-read the required textbook, handouts, and lecture presentations.

This is a traditional engineering course with intensive laboratory work. The laboratory exercises and project assignment are designed to best offer the students with technical knowledge, experience, and skill as defined from the course outcomes. Students may be able to do some laboratory work at home but that is NOT the purpose of this course. Laboratory exercises and design project are designed based on the course outcomes and are supported by laboratory equipment and parts available in laboratory room (ENG 307)

Dropping and Adding

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/calendars/>. 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/>.

Assignments and Grading Policy

Lectures

The course will follow the selected subjects as listed on the course description. Additional theory and examples will be given and discussed in class as much as time permits. Please note that lecture materials are NOT solely based on the required text and so students are responsible for following up the lecture in order to prepare themselves for the exams.

- Students are responsible for the reading the text, handouts, lecture presentations, etc.
- My personal experience: If you do not want to read and re-read the required textbook, handouts, lecture presentations, etc..., I suggest you NOT to take this class.
- Students are responsible for following up and keeping track of the in-class lecture materials and discussions.
- Students are responsible for finding and reading additional books, papers, examples, etc. in order to gain more understanding of the materials discussed in the lectures.

Exams

There will be three (3) lecture exams and one (1) final project test (for the lab.) **Exam and test dates and time are shown on the “Course Schedule”** section at the end of this syllabus (note that the final project test and demo is on the final exam schedule of the university.) Students are required to make sure that they are able to reserve dates and times for the lecture exams and the final project test and demo.

- **There will be NO sample exam provided, please do not ask for it**
- **ONLY the required textbook, Reference textbook, and lecture notes** are allowed during the lecture exams.
- One sheet (2 pages) of 8.5x11 **(your own) handwritten** note is allowed for each lecture exam. Other papers, notes, old-exams, etc. are **NOT** allowed.
- Calculator is **NOT** allowed.
- Lecture exams will cover the assigned reading materials and discussed materials in the lectures. Final project test will cover materials of the final project.
- There will be no make-up lecture exams and project test (in very special circumstances, written excuse and official proofs are required for making-up lecture exams).
- Lecture exam solutions will be discussed in class. Written solutions will **NOT** be distributed.

Homework Assignments

- **NO** late submission will be accepted (absolutely!) and there is no make-up homework.
- Homework must be submitted on canvas and solutions will be available after the due date. Do **NOT** submit HW via email.

- To get credit for your homework assignments, submissions must be neat, clean, and must be done professionally and seriously. Your official name (not nickname), course #, and homework # must be visibly shown on each assignment.

Laboratory Assignments

Scores of laboratory exercises and final project will be part of the total EE120 course grade and will be assigned by the laboratory instructor. The lab score will be combined with the lecture part to make up the final grade.

Grading Policy

The weights of the whole course work assignments are listed as below:

· Homework/Quiz assignments:	10%	} Laboratory
· 3 lecture exams (20% each):	60%	
· 6 laboratory exercises:	15%	
· Final project implementation, report and demo:	10%	
· Final project test:	05%	

And the overall course grade (letter-grade) will be assigned based on the distribution below:

· 100% to 86%:	Distributed for A+, A, and A-
· 85% to 71%:	Distributed for B+, B, and B-
· 70% to 56%:	Distributed for C+, C, and C-
· 55% to 41%:	Distributed for D+, D, and D-
· 40% and below:	F

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, located at http://www.sjsu.edu/senate/policies/pol_plagarism_acad_integrity/index.html, 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 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 Accessible Education Center (AEC) at <http://www.sjsu.edu/aec/> to establish a record of their disability.

EE Honor Code - Honesty and Respect for Others and Public Property

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 to 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
- Copy the project information from other students or have someone to do the project for me
- 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.”

Measures Dealing with Occurrences of Cheating

- Department policy mandates that the student or students involved in cheating will receive an “F” on that evaluation instrument (paper, exam, project, homework, etc.) and will be reported to the Department and the University.
- A student’s second offense in any course will result in a Department recommendation of suspension from the University.

1. "Schedule can be updated. Students should check the class canvas and their emails regularly."
2. "Optional review sessions are not lecture sessions and will NOT cover new materials but reviewing previous lectures. Attending review sessions are not mandatory."

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ntative Course Schedule (will be updated regularly)

Week	Lecture
1 M - Jan 30 th	Chap. 1
2 M – Feb 6 th	Chap 2
3 M – Feb 13 th	Chap 3
4 M – Feb 20 th	Chap 4
5 M – Feb 27 th	Chap 4 Exam #1 review, exam
6 M – Mar 6 th	Chap 5 & 6.
7 M – Mar 13 th	Chap 8
8	Chap 11

M – Mar 20 th	
9 M – Mar 27 th	spring break
10 M – Apr 3 rd	Exam #2 Chap 15
11 M – Apr 10 th	Chap 10
12 M – Apr 17 th	Chap 7
13 M – Apr 24 th	Bus
14 M – May 1 st	Bus
15 M - May 8 th	Review, Exam #3
16 M – May 15 th	Final