San José State University

Department of Computer

Science CS 47, Section 02

Introduction to Computer Systems

Spring 2024

Course and Contact Information

Instructor:	Pranavi Chaturvedula
Office Location:	Zoom (https://sjsu.zoom.us/my/pranavic)
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Email:	pranavi.chaturvedula@sjsu.edu
Office Hours:	Mon-Wed 4 - 5 pm
Class Days/Time:	MW 1:30 pm – 2:45 pm
Classroom:	MH 225
Prerequisites:	CS/MATH 42 or 42X, and CS 46B (with a grade of "C-" or better)

Course Format

This course encourages a good amount of class participation which carries weightage towards the final grade. The class is expected to be interactive as the tech world also develops on networking with people and interaction. To encourage this, there will be pop questions between classes for which **extra credit** is given. Students are expected to have computer systems with an internet connection. The materials are uploaded in Canvas before class. Students are encouraged to review the lecture notes before coming to class. All the homework and assignments are to be uploaded in Canvas which will be graded meticulously. The assignments must be documented in detail to attain the maximum score. There will be parallel presentations given by students in groups as per schedule on a topic of their choice, which must be approved by the instructor.

Course Description

Instruction sets, assembly language and assemblers, linkers and loaders, data representation and manipulation, interrupts, pointers, function calls, argument passing, and basic gate-level digital logic design.

Course Topics:

Computer Organization, Number representation, Programming a Computer, Compilation, Assemblers, Linker, Loader, MIPS assembly language programming, Run-Time Memory Stack, Interrupt & Exceptions, Boolean Algebra, Integer Mathematics, Logic Gates & Logic Design.

Course Objectives:

- To get introduced to the organization of a computer system

- To get familiarized with instruction sets and assembly programming and how it works in the hardware of the system

- To experience programming practice that reinforces binary data representation, assembly instructions, addressing modes, and run-time stack organization

- To get extensive lab practice using computer simulation

- To research and present on current technical developments in the field of powerful computing systems

- To understand the role of a system design engineer and software engineer

Learning Outcomes and Course Goals

Course Goal:

The course consists of an introduction to computer hardware organization and the hardware/software interface. Programming assignments are used to reinforce concepts of data representation, addressing modes, memory organization, run time stacks, and interfacing with high-level languages.

Course Learning Outcomes (CLO):

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

- To be familiar with the architectural components of a computer system: CPU (registers, ALU), memory, buses

- To be able to convert between decimal, binary, and hexadecimal notations.

- To work with two's complement integers, floating-point numbers, and character encodings

- To be able to write assembly programs that use load/store, arithmetic, logic, branches, call/return and push/pop instructions.

- To understand the gate-level operations of basic ALU

Required Texts/Readings

Other Readings
LOGIC & COMPUTER DESIGN FUNDAMENTALS
Author: MANO &
KIME
ISBN: 9780131989269
Publisher: PEARSON

Course Requirements and Assignments

Each student is expected to be present, punctual, and prepared at every scheduled class. It is assumed that the students already have basic knowledge of digital Boolean logic and fundamentals of assembly language machine programming.

Attendance is **NOT** optional. Individual participation is required and is graded. There will be no make-ups or postponing for missed mid-term or assignments unless any special arrangements are made with the instructor beforehand.

There will be **6 programming assignments, 6 quizzes**, **1 group presentation,** 2 **midterms** and **1 final exam** which will be **written** and **in-class** until further notice. All programming assignments and documents should be submitted through Canvas. Students may submit a scanned copy of handwritten solutions **only when required**. The allowed document type is **PDF** only.

The platform/software which we will be using will be discussed in class and relevant references for setting up will be provided on Canvas soon.

The presentation must be 20-30 minutes long and students must prepare presentation slides for the same. Additionally, a presentation report containing the following must be submitted on the date specified:
1. Introduction containing objective
2. Keywords

3. Design and Implementation, Comparisons
4. Drawbacks
4. Future Scope
5. Conclusion
6. References

Presentation reports are encouraged to be submitted in IEEE format. (extra credit for formatting correctly!)
[http://www.ieee.org/conferences_events/conferences/publishing/templates.html]

LockDown Browser + Webcam Requirement

This course requires the use of LockDown Browser and a webcam for online quizzes. The webcam can be the type that's built into your computer or one that plugs in with a USB cable.

Watch this brief video to get a basic understanding of LockDown Browser and the webcam

feature. https://www.respondus.com/products/lockdown-browser/student-movie.shtml

Download Instructions
Download and install LockDown Browser from this link:

https://download.respondus.com/lockdown/download.php?id=9679

37270

Once Installed

        Start LockDown Browser
        Log into to Canvas
        Navigate to the quiz

Note: You won't be able to access a quiz that requires LockDown Browser with a standard web browser. If this is tried, an error message will indicate that the test requires the use of LockDown Browser. Simply start LockDown Browser and navigate back to the exam to continue.

Guidelines
When taking an online quiz, follow these guidelines:

        Ensure you're in a location where you won't be interrupted
        Turn off all other devices (e.g. tablets, phones, second computers) and place them outside of your reach

Take the exam in a well-lit room, but avoid backlighting
Remember that LockDown Browser will prevent you from accessing other websites or applications; you will be unable to exit the test until all questions are completed and submitted

Final Examination or Evaluation

There shall be an appropriate final examination and evaluation at the scheduled time as indicated in the schedule unless specifically exempted by the college dean who has curricular responsibility of the course. The examination is expected to have descriptive, problem-analysis, assembly programming and problem-solving style questions to answer.

Grading Distribution

1. Programming assignments (Average of all)- **20%**
2. Quizzes (Average of All, least-scored quiz score will be dropped) - **15%**
3. Presentation - **20%**
4. Midterms - **20%**
5. Final - **20%**
6. **Class participation - 5%**

Submission for programming assignments is allowed till **before class only,** 2 students will be picked at random/volunteer to show their work at the beginning of the class for which extra credit applies. Zero delay tolerance for the submission.

After calculating the weighted scores of the above, the percentage will be converted into the nearest integer value ('>= 0.5' will be moved to the next integer number, '< 0.5' will be moved to the previous integer number).

A+ = 100-97%	A = 96-93%	A- = 92-90%
B+ = 89-87%	B = 86-83%	B- = 82-80%
C+ = 79-77%	C = 76-73%	C- = 72-70%
D+ = 69-67%	D = 66-63%	D- = 62-60%
F = 59-0% Failure		

Classroom Protocol

1. **You must come to class on time!** Students entering the classroom late disrupt the lecture and/or the students already in class who may be engaged in lab or discussion. Late students will not be accepted in class.

2. If you miss a lecture you are still responsible for any material discussed or assignments given.

3. No audio/video recording or photography in the classroom without prior permission of the instructor.

4. It is the individual **student's responsibility** to **check the validity** of their homework, assignment, project, and submission (format error, blank files, corrupted files, and many more) and re-submit within the deadline if needed. Once the grading is started there will be no consideration for resubmitting. ***If the submission is found to have any logistics issue at grading time (format error, blank files, corrupted files, and many more such) it will be evaluated as 0***.

5. No personal discussion or cell phone activity during class time. Please set the cell phone on **silent/vibrate** mode.

6. All e-mail communication to the instructor must have the subject line starting with **[CS47,02]**

7. Email to be sent to the instructor's SJSU email ID (pranavi.chaturvedula@sjsu.edu) only.
8. **Attendance for the first 2 classes is mandatory, absence for either will lead to being dropped from the class**

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 the Office of Graduate and Undergraduate Programs' Syllabus Information web page at http://www.sjsu.edu/gup/syllabusinfo/

Course Schedule – *subject to change by instructor with due notice.*

Date	Lecture	Notes
01/24	Syllabus Overview, Submit Prerequisite Survey (First Class)	
01/29	Introduction to Computer Systems	Use cases in real world, system programming,
01/31	Computer Organization	Architecture and Working, Code Instruction Flow at hardware-level
02/05	Number Representations in Computers	Data Types, Team Formation for Presentations
02/07	Programming a computer	Compilation Flow- Assembler, linker and loader, Code flow in depth
02/12	Intro to Assembly Programming	How to code in Assembly, syntax, simple programs
02/14	Assembly Programming- deep dive	**Announcement of PA-1-** How to submit programming assignments, platform emo Deadline to get Presentation Topic Approved
02/19	MIPS Assembly Language, Arithmetic & Logic Instructions	Quiz 1, **in class**
02/21	Memory Usage I	
02/26	Memory Usage II	
02/28	Comparison, branch & jump Instruction	
03/04	Procedure Call	**Presentation- Team 1**
03/06	Example 'printf' procedure call	**Presentation- Team 2**
03/11	Midterm Review I	**Presentation- Team 3**
03/13	Midterm Review II	Quiz 2
03/18	Midterm Exam (during class)	
03/20	Boolean Algebra I	**Presentation- Team 4**
03/25	Boolean Algebra II	**Presentation- Team 5**
03/27	Logic gates	**Presentation- Team 6**
04/01	Spring Break	
04/03	Spring Break	
04/08	Logic Design Components	**Presentation - Team 7**
04/10	Logic Circuit Design	**Presentation - Team 8**
04/15	Midterm Exam (during class)	

04/17	Addition / Subtraction Logic	Quiz 4
04/22	Multiplication Logic	**Presentation - Team 9**
04/24	Division Logic	**Presentation - Team 10**
04/29	Floating Point Number Representation	Quiz 5
05/01	Exceptions & Interrupts	**Presentation - Team 11**
05/06	Review I	**Presentation - Team 12**
05/08	Review II	
05/13	Course Review	**Last Day of Instruction** Quiz-06
05/17		**Presentation Report Due**
05/17	**Final Exam 12:00 - 2:30 PM**	