CS 382 Computer Architecture and Organization

CS/SES
Fall 2021

Meeting Times:	Monday-Wednesday-Friday, 12:00-12:50 pm
Classroom Location:	TBD
Instructor:	Philippos Mordohai
Contact Info:	Philippos.Mordohai@stevens.edu
Office Hours:	Monday 4:00-5:00 pm, Thursday 6:00-7:00 pm and by appointment on https://stevens.zoom.us/my/mordohai
Course Web Address:	https://sit.instructure.com/courses/49863
Prerequisite(s):	CS 284
Corequisite(s):	N/A
Cross-listed with:	N/A

COURSE DESCRIPTION

An introduction to computer architecture. Topics include: data (data types and formats), hardware (stored program computer concept, addressing methods and program sequencing, instruction sets and their implementation, the CPU and microprogrammed control, input/output organization, peripherals and interfacing, and main memory), communication (network protocols), software (operating systems, dispatching algorithms), assembly language programming, compiling, debugging.

LEARNING OBJECTIVES

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

1. **[Computer System Architecture]** Identify and explain the functions of the basic architectural components: the CPU, Memory, I/O, Storage system, Peripherals architecture.
2. **[Parallel Computing]** Explain different techniques of Multi-Processing, Parallelism in design of high-performance processors.
3. **[Advanced Computer Organization]** Explain additional topics in computer architecture, such as Operating Systems, Networking, Distributed System, and Cloud.
4. **[Assembly Language]** Acquire skills in assembly language programming and write advanced programs using branching, the stack, and subroutines. Become familiar with the development and debugging environments.
5. **[C Language]** Write C programs, demonstrate skills with C memory management, pointers, and pointer arithmetic.

FORMAT AND STRUCTURE

This course is comprised of three lectures per week, one lab session, homework assignments and exams.

COURSE MATERIALS

Textbook(s):

(COaD) David A. Patterson and John L. Hennessy. Computer Organization and Design ARM Edition: The Hardware Software Interface. Morgan Kaufmann, 2016

zyBook

1. Sign in or create an account at learn.zybooks.com
2. Enter zyBook code STEVENSCS382Fall2021
3. Subscribe

A subscription is $102. Students may begin subscribing on Aug 16, 2021, and the cutoff to subscribe is Dec 09, 2021. Subscriptions will last until Jan 07, 2022.

(CNASA) Larry Peterson and Bruce Davie: Computer Networks: A Systems Approach, version 6.2-dev, 2019
Available at https://book.systemsapproach.org/

Materials: Available on Canvas

COURSE REQUIREMENTS

Attendance	Attendance is mandatory for both lectures and labs.
Participation	Participation is strongly encouraged, but not graded.
Homework	There will be seven homework assignments including two programming assignments.
Exams	There will be two midterms and one final exam.

GRADING PROCEDURES

Grades will be based on:

Homework assignments (5)	20%
Programming projects (2)	10%
Quizzes and Lab Assignments	28%
zyBook problems	7%
Midterms (2)	20%
Final Exam	15%

LATE POLICY

No late submissions will be allowed without consent from the instructor. If urgent or unusual circumstances prohibit you from submitting a homework assignment in time, please e-mail me **before** the deadline. If you missed the deadline by a few minutes, e-mail me your submission immediately.

ACADEMIC INTEGRITY

Undergraduate Honor System

Enrollment into the undergraduate class of Stevens Institute of Technology signifies a student's commitment to the Honor System. Accordingly, the provisions of the Stevens Honor System apply to all undergraduate students in coursework and Honor Board proceedings. It is the responsibility of each student to become acquainted with and to uphold the ideals set forth in the Honor System Constitution.

More information about the Honor System including the constitution, bylaws, investigative procedures, and the penalty matrix can be found online at http://web.stevens.edu/honor/

The following pledge shall be written in full and signed by every student on all submitted work (including, but not limited to, homework, projects, lab reports, code, quizzes and exams) that is assigned by the course instructor. No work shall be graded unless the pledge is written in full and signed.

"*I pledge my honor that I have abided by the Stevens Honor System*."

Reporting Honor System Violations
Students who believe a violation of the Honor System has been committed should report it within ten business days of the suspected violation. Students have the option to remain anonymous and can report violations online at www.stevens.edu/honor.

EXAM ROOM CONDITIONS

The following procedures apply to quizzes and exams for this course. As the instructor, I reserve the right to modify any conditions set forth below by printing revised Exam Room Conditions on the quiz or exam.

1. Students may use the following devices during quizzes and exams. Any electronic devices that are not mentioned in the list below are not permitted.

Device	**Permitted?**	
	Yes	No
Laptops		X
Cell Phones		X
Tablets		X
Smart Watches		X
Google Glass		X

2. Students may use the following materials during quizzes and exams. Any materials that are not mentioned in the list below are not permitted.

Material	**Permitted ?**	
	Yes	No
Handwritten Notes		X
Typed Notes		X
Textbooks		X
Readings		X

3. Students are NOT allowed to work with, talk to, or communicate in way with other students during quizzes and exams.

LEARNING ACCOMODATIONS

Stevens Institute of Technology is dedicated to providing appropriate accommodations to students with documented disabilities. The Office of Disability Services (ODS) works with undergraduate and graduate students with learning disabilities, attention deficit-hyperactivity disorders, physical

disabilities, sensory impairments, psychiatric disorders, and other such disabilities in order to help students achieve their academic and personal potential. They facilitate equal access to the educational programs and opportunities offered at Stevens and coordinate reasonable accommodations for eligible students. These services are designed to encourage independence and self-advocacy with support from the ODS staff. The ODS staff will facilitate the provision of accommodations on a case-by-case basis.

For more information about Disability Services and the process to receive accommodations, visit https://www.stevens.edu/office-disability-services. If you have any questions please contact: Phillip Gehman, the Director of Disability Services Coordinator at Stevens Institute of Technology at pgehman@stevens.edu or by phone 201-216-3748.

Disability Services Confidentiality Policy

Student Disability Files are kept separate from academic files and are stored in a secure location within the Office of Disability Services. The Family Educational Rights Privacy Act (FERPA, 20 U.S.C. 1232g; 34CFR, Part 99) regulates disclosure of disability documentation and records maintained by Stevens Disability Services. According to this act, prior written consent by the student is required before our Disability Services office may release disability documentation or records to anyone. An exception is made in unusual circumstances, such as the case of health and safety emergencies.

INCLUSIVITY

Name and Pronoun Usage

As this course includes group work and in-class discussion, it is vitally important for us to create an educational environment of inclusion and mutual respect. This includes the ability for all students to have their chosen gender pronoun(s) and chosen name affirmed. If the class roster does not align with your name and/or pronouns, please inform the instructor of the necessary changes.

Inclusion Statement

Stevens Institute of Technology believes that diversity and inclusiveness are essential to excellence in academic discourse and innovation. In this class, the perspective of people of all races, ethnicities, gender expressions and gender identities, religions, sexual orientations, disabilities, socioeconomic backgrounds, and nationalities will be respected and viewed as a resource and benefit throughout the semester. Suggestions to further diversify class materials and assignments are encouraged. If any course meetings conflict with your religious events, please do not hesitate to reach out to your instructor to make alternative arrangements.

You are expected to treat your instructor and all other participants in the course with courtesy and respect. Disrespectful conduct and harassing statements will not be tolerated and may result in disciplinary actions.

MENTAL HEALTH RESOURCES

Part of being successful in the classroom involves a focus on your whole self, including your mental health. While you are at Stevens, there are many resources to promote and support mental health. The Office of Counseling and Psychological Services (CAPS) offers free and confidential services to all enrolled students who are struggling to cope with personal issues (e.g., difficulty adjusting to college or trouble managing stress) or psychological difficulties (e.g., anxiety and depression). Appointments are strongly encouraged and can be made by phone (201-216-5177) or in-person (on the 7th floor of the Howe Center). CAPS is open from 9:00 am – 5:00 pm Mondays, Wednesdays, Thursdays and Fridays and from 9:00 am – 7:00 pm on Tuesdays during the Fall and Spring semesters.

EMERGENCY INFORMATION

In the event of an urgent or emergent concern about the safety of yourself or someone else in the Stevens community, please immediately call the Stevens Campus Police at 201-216-5105 or on their

emergency line at 201-216-3911. These phone lines are staffed 24/7, year round. Other 24/7 resources for students dealing with mental health crises include the National Suicide Prevention Lifeline (1-800-273-8255) and the Crisis Text Line (text "Home" to 741-741). If you are concerned about the wellbeing of another Stevens student, and the matter is *not* urgent or time sensitive, please email the CARE Team at care@stevens.edu. A member of the CARE Team will respond to your concern as soon as possible.

TENTATIVE COURSE SCHEDULE

The actual schedule will be available on Canvas.

Week Starting	**Topic(s)**	**Readings**	**Assignments (due)**
Aug 30	Introduction	COaD Ch1 and Introduction to C	
Sep 6 (Sep 6 is Labor Day)	Introduction	COaD Ch1 and Introduction to C	
Sep 13	Instructions	COaD Ch2 and ARM documentation	Assignment #1 (Ch 1)
Sep 20	Instructions	COaD Ch2 and ARM documentation	
Sep 27	Instructions	COaD Ch2 and ARM documentation	
Oct 4	Instructions	COaD Ch2 and ARM documentation	Assignment #2 (Ch 2)
Oct 11 (Oct 11 is fall recess. Oct 12 is on Monday schedule)	Instructions	COaD Ch2 and ARM documentation	**Midterm #1**
Oct 18	Processor Implementation	COaD Ch4	Programming Project #1
Oct 25	Processor Implementation	COaD Ch4	
Nov 1	Processor Implementation	COaD Ch4	Assignment #3 (Ch 4) Midterm #2
Nov 8	Memory Hierarchy	COaD Ch5	Programming Project #2
Nov15	Memory Hierarchy	COaD Ch5	Assignment #4 (Ch 5)
Nov 22 (Monday only)	Parallel Processors and Multicore	COaD Ch6	
Nov 29	Parallel Processors and Multicore	COaD Ch6	Assignment #5 (Ch 6)
Dec 6	Fundamentals of Networking	Computer Networks: A Systems Approach	