

Abstract

This course covers the computer organization and architecture of the important components of computing systems, and how those components are interrelated. The course is oriented towards providing an understanding of computer organization and architecture by the computer science (game development) student so that the student can understand how to best program any particular architecture, and how to best select the proper architecture. This course is the necessary preparation for the CSCI 452 Game Hardware Architectures course

Instructor Info

Instructor:	Dr. Shahin Nazarian	Office Hours:	T, Th: 8:20-9:20am & 5-6pm
Office:	EEB 340		Other days by appointment
E-mail:	shahin.nazarian@usc.edu	Office Phone:	(213) 740-4653

TA and Grader Info

TA:	Sabyasachi Ghosh
Office:	EEB106 (213) 740-3487
Office Hours:	M, W 2-3pm at EEB106
E-mail:	sabyasag@usc.edu

Grader:	Abhinav Chandran
Office Hours:	TBA for each HW
E-mail:	chandraa@usc.edu

Class Info

30677D	Lecture	TTh 9:30am-10:50am	RTH109
30678D	Lab	F 1:00-1:50pm	RTH105

Course Materials

URL (Blackboard):	http://blackboard.usc.edu
Textbook (Required):	Patterson and Hennessy, "Computer Organization and Design: The Hardware/Software Interface", 4 th ed. (ISBN: 978-0-12-374493-7)

Grading Policy

Homework + Labs =	27% (drop lowest HW)
Midterm I =	30%
Midterm II =	40%
Pop Quizzes =	0.7% per Quiz (Extra Credit)
Office visit =	3%

Homework Assignments

*Homework assignments are designed to familiarize you with the problems and skills you will need for quizzes and exams. Only by doing real problems on your own will you develop the skills and understanding to succeed. It is expected that each student will present their own work in their own creative way. (You should show all the steps used to arrive at the solution). Copying or allowing others to copy homeworks will result in a 1 letter grade deduction for the **entire course**. Homeworks should be done **neatly and be stapled together**. There will be approximately 8 homework assignments. Homeworks are due at the beginning of class, unless otherwise announced. Late*

assignments will be accepted for 2 days after the due date with a 15% deduction per day. Solutions will be posted 2 days after the due date after which no late work will be accepted unless accompanied by a valid excuse. If you have extenuating circumstances, e-mail me so we can work out an arrangement.

Labs

Labs are critical not only to your grade but are really the true evaluation of your learning. The labs in this class are intended to prepare you with the skills needed to succeed in industry and real-world jobs. Copying or allowing others to copy labs will result in a 1 letter grade deduction for the **entire course**. Labs are to be turned in to your **TA**. Late assignments will be accepted for 2 days after the due date with a 15% deduction per day. If you have extenuating circumstances, e-mail me so we can work out an arrangement.

Exams

Exams will be closed book. There will be no calculators allowed; just bring a few pencils and an eraser. Any cheating will result in an "F" in the course and will be referred to Student Affairs for other penalties. Make up exams will only be given for valid medical or family emergency excuses (proof required). We will have several pop quizzes in the beginning of some of our lectures. Each quiz weighs 0.7% extra credit!

Exam	Date	Location
Midterm I	Thursday, March 11, 9:30-11:00am	TBA
Midterm II	Thursday, April 29, 9:30-11:00am	TBA
Pop Quizzes	Not pre-announced	In class

Attendance

You are expected to attend ALL lectures; however attendance will not be taken. Instead, we will have pop quizzes in the beginning of some of our classes.

Office visits and Participation

You will receive 3% of your course grade for making two *office visits* starting from the 3rd week of class but the first visit *before the drop date, April 9th* and the second *before the last week of the class*. This is designed to help me teach you more effectively and allows you to ask questions.

Academic Accommodations

Any student requiring academic accommodations based on a disability is required to register with Disability Services and Programs (DSP) each semester. A letter of verification for approved accommodations can be obtained from DSP. Please be sure the letter is delivered to me as early in the semester as possible. DSP is located in STU 301 and is open 8:30 a.m. - 5:00 p.m., Monday through Friday. The phone number for DSP is (213) 740-0776.

Expectations

Attend class, do your assignments, ask questions and participate!

EE 352 Course Schedule and Lecture Topics:

Wk	Tuesday	Thursday	Textbook Sec.	Labs
1	Intro to Computer Systems	Data Representation (Binary, Hex, 2's comp.)	Ch. 1 3.1-3.2	
2	Arithmetic & Overflow Floating Point	Floating Point HW1 due	3.5-3.7	
3	Computer Organization Arithmetic & Logical Instrucs. Load/Store instructions	Instruction Representation Logical & Shift Instructions Assembler Directives Pseudo-instructions HW 2 due	Ch . 1, 2.2 - 2.6, 2.9 - 2.10	Assem. Lab: Sort or Palindrome
4	Comparison & Branches Subroutines & Stacks	Subroutines Recursive Routines Stack Frames HW 3 Due	2.7 - 2.8, 2.14	
5	More Stack Frames ISA Survey (PPC & Intel)	Exceptions, Traps, Syscalls	4.9	Assem. Lab: Recursive Maze Search
6	Logic Design Overview Combinational vs. Sequential Elements	Performance HW 4 Due	Appendix C	
7	Performance (cont.) Main Memory Architecture	Main Memory Organization DRAM vs. SRAM	1.4 6.5-6.6	Assem. Lab: Matrix Multiply
8	Cache Basics	Cache Mappings HW 5 Due		
9	Cache Modeling and Analysis	Midterm, March 11th		
Spring Break – March 15-20				
10	Memory Models for Parallel Programming Synchronization Techniques	Virtual Memory	5.1-5.3	Cache Sim. Lab: Matrix Multiply
11	CPU Organization	Basic Pipelining & Hazards HW 6 Due	5.4	
12	Out-of-Order Execution	Advanced Pipelining ILP & Static Scheduling HW 7 Due	5.4, 4.1-4.5	
13	ILP & Dynamic Scheduling	Branch Predictors Data Level Parallelism	7.5, Notes	Lab: Parallel Matrix Multiply
14	Thread Level Parallelism	Supercomputer Organization Cell Processor Case Study		
15	Final Review HW8 Due	Midterm II, April 29th		