

CS 380 – Computer Architecture

Course Syllabus and Calendar – Fall 2001

Professor Don Colton

Brigham Young University—Hawaii Campus

1 Brief Overview

1.1 The Course

- **Course Number:** CS 380
- **Title:** Computer Architecture
- **Course Description:** Instruction sets, hardwired and microprogrammed control, interrupts, memory hierarchy, virtual memory, input/output interfacing, and alternate architectures. (Prereq: CS 143.)
- **Textbook:** *Computer Organization and Design, The Hardware / Software Interface, second edition*, by: David A. Patterson and John L. Hennessy. ISBN: 1-55860-428-6.
- **Class Time:** MWF 2:00–2:50 PM
- **Classroom:** GCB 153

1.2 The Instructor

- **Instructor (me):** Don Colton
- **My email:** don@colton.byuh.edu
- **My Office:** GCB 130 B
- **My Office Hours:** MWF 3–4
- **Teaching Assistant:** Andrew Thompson

1.3 Office Hours

Office hours for Fall 2001 are MWF 3–4, subject to change. Changes (if any) are posted outside my office door.

I am usually in my office. My “open-door policy” is posted on my office door as follows: “If my door is open (even just a bit) feel free to knock and come in. – Bro. Colton”

Students for whom the posted hours are not convenient, or who just want a guaranteed appointment, can come by whenever my door is open (which is most of the time) or contact me by email to make an appointment.

1.4 Special Needs

Brigham Young University—Hawai‘i is committed to providing a working and learning atmosphere, which reasonably accommodates qualified persons with disabilities. If you have any disability that may impair

your ability to complete this course successfully, please contact the students with Special Need Coordinator, Leilani A’una at 293-3518. Reasonable academic accommodations are reviewed for all students who have qualified documented disabilities. If you need assistance or if you feel you have been unlawfully discriminated against on the basis of disability, you may seek resolution through established grievance policy and procedures. You should contact the Human Resource Services at 780-8875.

1.5 Preventing Sexual Harassment

Title IX of the education amendments of 1972 prohibits sex discrimination against any participant in an educational program or activity that receives federal funds, including Federal loans and grants. Title IX also covers student-to-student sexual harassment. If you encounter unlawful sexual harassment or gender-based discrimination, please contact the Human Resource Services at 780-8875 (24 hours).

1.6 Subject to Change

It is possible that I will revise some aspects of the course as we go along. Any changes I make are likely to be to your advantage. If any of my changes seems unfair to you, let me know. I will try to correct it.

2 Why Take This Course?

Part of computer science is using the machines built by others, and part of computer science is designing and building those machines. It is the cooperation between programmer and hardware designer that leads to faster, more efficient machines, where the most critical activities are carefully optimized. The principles of design are constant. The current implementation of hardware is ever-improving. By understanding the essentials of hardware design, the computer scientist can better plan and carry out programming tasks in ways that take fullest advantage of the hardware available now and in the future.

3 Attendance

I take roll in this class. Attendance counts for 10% of your final grade. Typically attendance is worth 3 points per day. I take 3-point roll at the start of class. I take 2-point roll about 10 minutes into class. If you come later than that, you can get one point by making sure I notice you in class (maybe right after class). Missing and unnoticed persons get zeros.

Due to INS (immigration) and VA (veterans) requirements the Vice President for Student Life is supposed to be notified whenever a student misses four consecutive class days. I try to do this.

4 Lecture Policies

I typically use a flexible and open lecture style, rather than a regimented sequence of slides. I try to focus on interesting aspects of the subject matter, instead of simply repeating what you have read in the textbook. My goal is that you develop intuition about the subject matter, and get unstuck if you have become stuck. Accordingly, I devote as much time as necessary to answering your questions, especially when those questions seem to be of general interest to the others in the class. Otherwise, the time is generally spent in discussion of some topic or other that is closely related to the material in the textbook. I may pose a problem to the class and moderate as we work through it together. This can serve as a jump-start for understanding and mastering new material. My method of teaching is based on the view that learning is a shared activity between the teacher and the student, and that learning proceeds most quickly when interaction occurs.

5 Grading

I use the following grading scale for this class.

93%+	A	90–93%	A-	87–90%	B+
83–87%	B	80–90%	B-	77–80%	C+
73–77%	C	70–73%	C-	67–70%	D+
63–67%	D	60–63%	D-	0–60%	F

Grades will be computed on the following basis:

10%	attendance
30%	programming labs (3)
40%	homework, quizzes, and tests
20%	final exam
100%	total

Final Exam: Even though the final exam may count for just 20% of your overall grade, you must pass the final exam (60.0% or better) in order to get a C- or better in the class.

Homework: The primary purpose of homework is to encourage students to master the course material in a low-stress setting where resources such as the textbook can be consulted in a leisurely way. It is my policy that **regular homework in this course can be done with the aid of other students, and that answers can be compared.** It is not in anyone's best interest if answers are simply copied from person to person without at least some attempt at understanding. Generally homework means answering questions from the end of each section in the book. **Extra-credit (bonus) homework problems may be assigned from time to time. These add to your homework score, but are not required. Unlike regular homework, these must be done without the aid of other people, except that you can consult books or ask me (the instructor) for assistance.**

Late Homework: Homework assignments are due at the start of class, and should be turned in to me (at the front of the classroom) when you arrive. Typically I like to discuss a homework assignment on the day that it is turned in, or on the day that I return the graded assignment to the students of the class. This often involves disclosing the answers and discussing how the answers were derived. No late work is accepted **after the homework is discussed in class**, except when I approve it in unusual circumstances.

Quizzes: The primary purpose of quizzes is to measure student learning on a topic-by-topic basis. It shows me how the students are doing, and it shows you where you might need more attention before the bigger tests. There may be little or no warning before a quiz.

Quiz Makeup: Quizzes cannot be made up except when I approve it in unusual circumstances.

Programming: There are several programming assignments in this class. They demonstrate and improve your programming ability and help you consolidate your knowledge of the course material.

Tests: The primary purpose of tests (examinations) is to gauge student learning by measuring performance in a (possibly timed) supervised situation. It is understood that such a situation creates additional stress for many students. For this reason testing is not used exclusively in the grading process. Each test will receive a scaled (normalized) score and a letter grade indicating the final course grade that would be earned by consistent performance at the level reflected on that test.

Test Makeup: Tests cannot be made up except when I approve it in unusual circumstances.

Other notes: Whenever you think grading may be unfair or incorrect, I encourage you to discuss specific instances of grading with me, and to argue for a

different grade than I initially assigned. Some very good learning occurs in these settings (for you **and** for me). The best time to do this is during my office hours, or immediately before or after class if the issue is brief. As an alternative, you can submit your argument in writing, together with the original graded work.

Final grades are generally issued by email soon after the final exam, or in-person if I feel that some discussion might be beneficial. Students are invited to visit my office to claim any exams or homework that I am still holding, and to discuss their academic progress. Interim progress reports are issued to the students several times during the course, about once a month.

Incomplete and UW: In a class at this level, I probably do not have to say this, but if you quit working in the class before achieving a passing grade, I will probably give you a “UW” grade instead of an “F.”

I do not give “I” grades (incompletes) except in unusual circumstances. In my experience only a small fraction of incompletes are ever completed. I will consider giving you an incomplete if you request it, seem to have a good reason, have a pretty solid time line for completion, and you get the necessary paperwork filled out.

6 Communication by Email

When I want to say something, or when you want to say something, if we are not in the same room, my first choice is to do it by email. When there is an announcement, I will generally tell you in class or send it to you by email. Such announcements might include clarifications on the homework assignments. You must maintain an email account and provide me with a valid email address.

7 Computer Accounts

You should have a computer account in the Computer Science lab (GCB 101). This account gives you access to UNIX systems, software (including compilers and assemblers), email, some storage, and some paper printing. You will use your CS account to do the lab work in this class. See me or a lab worker (GCB 101) to get set up.

8 Subject to Change

It is possible that I will make any major or minor changes in the class plan as we go along. Important changes are generally communicated both in class and by email to those affected. If my changes seem unfair to you, let me know. I will try to fix it.

9 Course Calendar

Here is my best guess at the course calendar.

ISECON: I will be off-island for ISECON’2001, the Information Systems Educators Conference, in Cincinnati, Ohio. I am a member of the board of directors for EDSIG, the sponsoring organization, and am also the Proceedings editor. I plan to fly out Tuesday, Oct 30 and return Sunday, Nov 4. The conference is Thursday through Sunday. **There will be no class on Wednesday or Friday.**

ACM: I will be off-island, taking several programming students to compete in the regional ACM programming contest in Riverside, California. We will fly out Thursday, Nov 8 and return Sunday, Nov 11. The contest itself is on Saturday. **There will be no class on Friday.**

Chapter Tests: To make up for lost time, chapter tests will generally be held in the testing center. The final exam will be held in the regular classroom.

CS 380 Course Calendar — Fall 2001

Subject to change.

mtg	day	date	time	read	Topic	due (pts)
1	Wed	Aug 29	2pm		Introduction, Syllabus, Questionnaire, pretest	
2	Fri	Aug 31	2pm	1	Introduction	
	Mon	Sep 3			Labor Day Holiday	no class
3	Wed	Sep 5	2pm	2	Performance	
4	Fri	Sep 7	2pm	B	Basics of logic design	
5	Mon	Sep 10	2pm	B	continued	
6	Wed	Sep 12	2pm	4.5	Constructing an ALU	
7	Fri	Sep 14	2pm	4.5	continued	
8	Mon	Sep 17	2pm		tba	
9	Wed	Sep 19	2pm		Binary data representation	
10	Fri	Sep 21	2pm		Lab: binary number conversion	
11	Mon	Sep 24	2pm		Binary data representation	
12	Wed	Sep 26	2pm		Binary arithmetic	
13	Fri	Sep 28	2pm		Binary instruction representation, memorization	
14	Mon	Oct 1	2pm		Labs: assembler, disassembler	
15	Wed	Oct 3	2pm		Binary instruction representation, memorization	
16	Fri	Oct 5	2pm		tba	
17	Mon	Oct 8	2pm	5.1-2	Datapath	
18	Wed	Oct 10	2pm	5.3	Simple Implementation	
19	Fri	Oct 12	2pm	5.3	continued, memorize fig 5.17 p.358	
20	Mon	Oct 15	2pm	5.4	Multi-Clock Implementation	
21	Wed	Oct 17	2pm	5.4	continued	
22	Fri	Oct 19	2pm	5.5	Microprogramming	
23	Mon	Oct 22	2pm	5.6+	Exceptions, Fallacies, Summary	
24	Wed	Oct 24	2pm		tba	
25	Fri	Oct 26	2pm	7.1-2	Caches	
26	Mon	Oct 29	2pm	7.1-2	continued	
27	Wed	Oct 31	2pm		Colton at ISECON	no class
28	Fri	Nov 2	2pm		Colton at ISECON	no class
29	Mon	Nov 5	2pm	7.3	Virtual Memory	
30	Wed	Nov 7	2pm	7.3	continued	
31	Fri	Nov 9	2pm		11/9: ACM Programming Competition, California	no class
32	Mon	Nov 12	2pm	7.4+	Common Framework, Fallacies, Summary	
33	Wed	Nov 14	2pm		tba	
34	Fri	Nov 16	2pm	8.1-3	Input/Output Performance	
35	Mon	Nov 19	2pm	8.4	Busses	
36	Wed	Nov 21	2pm	8.5+	Interfacing, Fallacies, Summary	
	Fri	Nov 23			Thanksgiving Holiday	no class
37	Mon	Nov 26	2pm		tba	
38	Wed	Nov 28	2pm	9.1-4	SIMD, MIMD, shared address space	
39	Fri	Nov 30	2pm	9.5	MIMD Single Bus, cache coherency	
40	Mon	Dec 3	2pm	9.6	MIMD Network	
41	Wed	Dec 5	2pm	9.7+	Future, Fallacies, Summary	
42	Fri	Dec 7	2pm		Final Exam Preview	
	Wed	Dec 12	3-6		Final Exam	