CS 235 – Foundations of Computer Science I
Course Syllabus and Calendar – Fall 1998

Instructor: Don Colton

Brigham Young University—Hawaii Campus

Abstract

- **Course Number:** CS 235
- **Title:** Foundations of Computer Science I
- **Course Description:** Iteration, induction, and recursion. Proving properties of programs. Algorithm complexity analysis. Definition, implementation, and use of trees, lists, stacks, queues, sorting, searching, hashing, sets, relations. (Prereq: MATH 112, CS 142.)
- **Textbook:** *Foundations of Computer Science, C Edition*, by: Alfred V. Aho and Jeffrey D. Ullman
- **Class Time:** MWF 2:00–2:50 PM
- **Classroom:** GCB 143
- **Instructor (me):** Don Colton
- **My email:** don@colton.byuh.edu
- **My Office:** GCB 130 B, Phone: 293-3478
- **My Office Hours:** MWF 10–11

1 Why Take This Course?

In programming, there are certain "tricks of the trade" that you as a computer scientist are simply expected to know. This knowledge is the foundation of computer science as we know it today, and much of it is taught in this two-part course.

2 Course Content

The full "course" is organized into two halves, CS 235 and CS 236, which should be taken in that order. The first half covers program running time (big-oh notation), probability and counting (how long would a program run if it had to look at every case before it found the solution?), trees, lists, and sets.

CS 236 covers relations, graphs, automata, and logic from chapters eight through twelve and chapter fourteen of the textbook.

3 Attendance

This will not be a large class, and as far as possible we will work together as a team. Our common goal will be the education of each member of the class. On-time arrival will be rewarded by occasional treats and by our ability to cover more ground together. Please come on time.

If you do not attend, you will become disconnected from the team and from the flow of the material. Your interest is likely to grow cold and your odds of passing the course will be greatly reduced. Also, I become depressed if attendance falls off. (Be kind to me.)

Some days are marked "Review/Test" on the course calendar. On those days we will meet in the normal classroom but attendance is not required. Your taking of the exam (in the testing center) counts for attendance on those days.

Due to INS (immigration) and VA (veterans) requirements the Vice President for Student Life is notified whenever a student misses four consecutive class periods.

4 Lecture Policies

My most important goal is for you to develop intuition about the subject matter, and to get unstuck if you have become stuck. Accordingly, I devote as much time as necessary to the answering of your questions, especially when those questions seem to be of general interest to the others in the class. (Questions of narrow interest may be deferred to my office.) 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 Work Load

In the United States, the expectation for accredited university-level course work is that there be an average of three hours of work per week for every hour of credit awarded. In a lecture class this means one hour

in class and two hours outside of class. It is my goal to keep the work load for an average member of the class at these levels.

I expect you to read regularly in the textbook. It is excellent. The authors are highly respected, have a nice presentation style, and they know their material. It is a good book. You will benefit from reading it.

There is an average of 10 pages of reading per class hour (about 400 pages for the course). I figure that should take you about an hour, some days more, some days less. Some of the reading is slow and careful but much of it is story. The course calendar lists by chapter and section the topics that will be discussed. To maximize your understanding, you should read the relevant sections before attending class and then review them again after class. Even if we do not discuss all of a chapter, you are responsible for its contents on the chapter test and final exam. Skim back through them the day before the exam.

Many small programs will be assigned. I expect these to take about an hour each. Early programs will be short—perhaps ten or twenty lines. Later programs will be longer and more challenging. I want programming to become a routine activity for you.

A small amount of homework will be assigned. Generally reading, programming, and homework together will not exceed two hours per class period. If you find the workload to be heavier than that, please let me know and I will try to back off a bit.

What is the hardest part of the class? I don't know yet, but I suspect it will be the programming.

6 Grading

Grades will be computed on the basis of points earned on homework, quizzes, lab work, and tests. The weighting is as follows:

- **10.0%** homework and quizzes
- **46.5%** labs
- **43.5%** exams
- **100.0%** total

Homework: The purpose of homework is to help you master the course material in a low-stress setting where resources such as the textbook can be consulted in a leisurely way. **Homework in this course can be done with the aid of other students, and answers can be compared.**

Late Homework: Late homework is occasionally accepted if your excuse is good enough and I happen to be in a good mood.

Quizzes: The purpose of quizzes is to show me and you how well you are learning on a topic-by-topic basis. Most things on the exams show up on quizzes first.

Quiz Makeup: Quizzes cannot be made up except when I approve it in unusual circumstances (including good excuse and good mood).

Labs: The purpose of labs is to experience programming and grow thereby. Programming can be an extreme joy, where time ceases to exist (e.g., "just a minute" can be several hours, but you don't notice). It can be a great pleasure to cause a machine to obey your will, an inch at a time. Or it can be a nightmare, where nothing seems to work right, and the most insignificant things turn out to have far too much significance, and you pull out great clumps of your hair and hit you head against the wall and want to rush right over to your academic advisor and change majors to something you can actually enjoy instead of this misery. Labs reflect the true reality of computer science life. You should experience them.

All labs will be "open-neighbor" labs in the sense that you can confer with other students and lab assistants. You can show your code to others and look at the code others have written. You can also talk about your code, your approach, your difficulties, and your ideas. You can draw pictures and make analogies and ask me (even me) questions. However, **you are forbidden to look at your own code and somebody else's code at the same time.** (In order to copy something, you must memorize it.)

Due Dates: Each lab is listed on a day on the course calendar. That is the day it will be discussed in class. For the "hello" lab that day is Aug 28.

Labs worth 1.5 points are due the next time we meet, as though they were homework. Actually, you can have until midnight to send them in. For the "hello" lab that day is Aug 31.

Labs worth 3.0 points are due the third time we meet. Usually this is a week later. You can have until midnight to send them in. For the "hash" lab that day is Dec 2.

I will give you the specs for each lab at least a week before we discuss it in class. Most of the labs are pretty well firmed up right now and specs will be given to you today. Some are still under development.

Late Labs: Labs are not accepted late except when I approve it in unusual circumstances. This is *very* rare.

Added or Deleted Labs: If the actual labs are different from the ones on the calendar, I will rescale the final total to still be 46.5% of the final grade. Thus, if I drop a 3.0% lab the raw total will be 43.5, and I will divide by 43.5 and multiply by 46.5 before computing your final grade.

Tests: The primary purpose of tests (examinations) is to gauge student learning by measuring performance in

a timed and supervised situation. Some memorization may be required.

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.

Testing Center: Except the final exam, most tests are given in the BYUH testing center. The day of the exam we will preview it in class. You can take the exam that same day or the next day. Generally I allow unlimited time but no books or notes.

Test Makeup: Exams cannot be made up except when I approve it in unusual circumstances. This is *very* rare.

Grading Scale: I use the following grading scale, both for individual assignments and for the course as a whole.

93%+	A	90–92.9%	A-	87–89.9%	B+
83–86.9%	B	80–82.9%	B-	77–79.9%	C+
73–76.9%	C	70–72.9%	C-	67–69.9%	D+
63–66.9%	D	60–62.9%	D-	0–59.9%	F

Test Average: Your test average, including the final exam, must be 60% or more in order to get a C- or better in the class.

Other notes: I reserve the right to up-scale the scores on any assignment, exam, or whatever, if I feel the absolute numeric grading is too harsh. The transformation may even be non-linear, but in any case, absolute rank order will be preserved and no score will go down.

I welcome the opportunity to discuss specific instances of grading with you, and to hear your requests for different grades than were initially assigned. In fact, I encourage it. Some very good learning occurs in these settings (for you **and** for me). About half the time I end up agreeing with the request. The best time to do this is during my office hours. 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, generally after the midterm exams and before the final exam.

7 Office Hours

Office hours are posted outside my office door. Currently they are Daily 1–2. Office hours are subject to change, as I might discover the need to attend some meeting somewhere, or visit the men's room, or talk to someone in the computer lab.

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.

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"

8 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. I far prefer it to telephone calls, for instance. 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.

Programming homework is submitted by email from the student to me, and the grading of such homework is returned by email. You will need to maintain an email account and to provide me with a valid email address.

9 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, web surfing, some storage (currently 10 megabytes to start with), and some paper printing (currently 100 pages per CS class). There are also a few modems for dial-in access. 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.

10 Subject to Change

It is very unlikely that I will make any major changes, but aside from course number, title, and description, I reserve the right to change anything in this syllabus including the grading policies and the course calendar. Important changes are generally communicated in class and by email to those affected. If my changes are unfair to you, let me know. I will try to fix it.

11 Course Calendar

The course calendar is subject to change by me at any time for any reason. To avoid disruption and unhappi-

ness, I avoid changes (especially exam dates) as much as I can. Any substantial change will be communicated in class and by email.

CS 235 Tentative Course Calendar Fall 1998

mtg	day	date	time	read	Topic		pct
1	Wed	Aug 26	2pm		introduction, syllabus, questionnaire, pretest		
2	Fri	Aug 28	2pm		lab	hello	1.5
3	Mon	Aug 31	2pm	1.1-3	data structures	argc	1.5
4	Wed	Sep 2	2pm	1.4+	algorithms	argv	1.5
5	Fri	Sep 4	2pm		Review/Test		1.5
	Mon	Sep 7			Labor Day		
6	Wed	Sep 9	2pm	2.1-2	iteration	sum	1.5
7	Fri	Sep 11	2pm	2.3-4	induction	prod	1.5
8	Mon	Sep 14	2pm	2.5	proofs	loop	1.5
9	Wed	Sep 16	2pm	2.6-7	recursion	tri	1.5
10	Fri	Sep 18	2pm	2.8+	recursion	fac	1.5
11	Mon	Sep 21	2pm		Review/Test		4.5
12	Wed	Sep 23	2pm	3.1-3	running time	fib	3.0
13	Fri	Sep 25	2pm	3.4-5	big oh		
14	Mon	Sep 28	2pm	3.6-7	analysis		
15	Wed	Sep 30	2pm	3.8-9	analysis	sort	3.0
16	Fri	Oct 2	2pm	3.10+	recurrences		
17	Mon	Oct 5	2pm		Review/Test		4.5
18	Wed	Oct 7	2pm	4.1-3	assignments, permutations	count	1.5
19	Fri	Oct 9	2pm	4.4-5	selections	oswor	1.5
20	Mon	Oct 12	2pm	4.6-8	identical items, bins	choose	1.5
21	Wed	Oct 14	2pm	4.9-10	probability	owii	1.5
22	Fri	Oct 16	2pm	4.11+	expected value	do2b	1.5
23	Mon	Oct 19	2pm		Review/Test		4.5
24	Wed	Oct 21	2pm	5.1-3	basics	traverse	3.0
25	Fri	Oct 23	2pm	5.4-5	recursing and induction		
26	Mon	Oct 26	2pm	5.6-7	binary (search) trees	bst	3.0
27	Wed	Oct 28	2pm	5.8-9	priority queues		
28	Fri	Oct 30	2pm	5.10+	heapsort	pq	3.0
29	Mon	Nov 2	2pm		Review/Test		4.5
30	Wed	Nov 4	2pm	6.1-3	basics	stack	3.0
31	Fri	Nov 6	2pm	6.4-5	linked lists and arrays	queue	3.0
32	Mon	Nov 9	2pm	6.6-7	stacks		
33	Wed	Nov 11	2pm	6.8-9	queues, lcs	lcs	3.0
34	Fri	Nov 13	2pm	6.10+	character strings		
35	Mon	Nov 16	2pm		Review/Test		4.5
36	Wed	Nov 18	2pm	7.1-3	basics		
37	Fri	Nov 20	2pm	7.4-5	list, characteristic vector		
38	Mon	Nov 23	2pm	7.6	hashing	hash	3.0
39	Wed	Nov 25	2pm	7.7-9	relations and functions		
	Thu	Nov 26			Thanksgiving Thursday		
	Fri	Nov 27			Thanksgiving Friday		
40	Mon	Nov 30	2pm	7.10+	infinite sets		
41	Wed	Dec 2	2pm		Review/Test		4.5
42	Fri	Dec 4	2pm		Review for Final Exam		15.0
	Wed	Dec 9	3-6		**Comprehensive Final Exam**		
	Fri	Dec 11	noon		Final Grades by email		