

Syllabus for CSCI 351 Intro Computer Systems Fall 2013

Cary G. Gray

Office: Science 159, x5875

Office hours: MWF 2:30-4:00 p.m.

Th 2:00-3:30 p.m.

I am typically in my office much more than the posted times, and you are welcome to stop by whenever my door is open. Check with me ahead of time if you want to be sure that I'll be there outside scheduled times.

Class meetings

MWF 9:15–10:20 a.m., Science 131

Final exam: 8:00–10:00 a.m. on Wednesday, Dec. 18

On-line resources

Additional (and updated) course information will be available at the class page at

<http://cs.wheaton.edu/~cgray/csci351/>

Texts

Bryant and O'Hallaron, *Computer Systems: A Programmer's Perspective/2e*, Prentice Hall, 2010.

I also recommend that you have access to some reference for the need to have a C (not C++) language and library. The following is a very good reference:

Harbison and Steele, *C: A Reference Manual*, fifth edition, Prentice-Hall, 2002.

Description

CSCI 351 Introduction to Computer Systems

An introduction to low-level systems issues from the perspective of the programmer. Representation of both data and program as produced by a compiler; hardware support for memory, input/output, and parallelism; fundamental ideas in operating systems and networking.

Prerequisite: CSCI 245.

By the end of this class, you should gain:

1. Facility in programming in C, including use of the standard libraries;
2. An understanding of the different levels at which programs and data are represented;
3. Ability to program in light of low-level understanding, especially with regard to representation and performance;
4. An understanding of key abstractions provided by programming languages and operating systems, including at least one way in which they can be implemented; and
5. Ability to use standard vocabulary to describe system features.

Exams and written homework will largely cover items 2, 4, and 5; programming assignments will include items 1 and 3 as well.

Grading. Your grade will be based on the following:

- 50% exams
- 10% participation (including attendance)
- 40% homework (including programs)

There will be two in-class exams (planned for **October 2** and **November 5**) in addition to the final. The final exam will be weighted more heavily than the in-class exams.

Policies

Attendance. I expect you to be in class, and you are responsible for what happens in class whether you are present or not. If you are sick or must miss because of other school responsibilities, let me know in advance. If there is an emergency, let me know as soon as practical. You must make arrangements for make-up work (including exams) *in advance*; after-the-fact arrangements will be permitted only for emergencies, and then only with your timely notification and, in the case of illness, confirmation by the Health Center. (You'll do well to think of this as practice for keeping a job. Note that you can reach me by e-mail, and my office phone takes messages at all hours.)

I also expect you to be on time. If you come in late, don't interrupt class, and plan to find out what you've missed from another student *after* class. If the door is locked when you arrive, do not disturb the class.

Your presence in class calls for your full attention. That implies no use of networked devices to be virtually somewhere else. *If* you need to use a computer of some sort for access to your textbook or to take notes, you should do so with the networking turned off, and you are implicitly promising that you will not use it for any other purpose during class.

Preparation. You are expected to read assigned material, as indicated in the class schedule, before each class meeting: what we do in class will assume that you've done the reading. As you read, note anything that you aren't sure about, and bring your questions to class.

Projects Programming assignments are scheduled so that you should be able to complete them a day or two before the due date. Plan to complete them early; that way you'll have time to ask questions about them in class, and you'll have time to deal with surprises.

Written homework will be due at the beginning of class, though we may take time to discuss it before it is collected. As with the programs, the due dates are generally set to allow you to attempt the homework a class meeting before it is due. All homework should be neat, clearly labeled, and written on one side only of letter-sized paper; multiple pages should be stapled together.

Be sure you turn in what you have on time: I do *not* promise to give credit for late assignments.

Academic integrity. I expect you to conduct yourself honestly in this course. When you submit work, you assert that it is your own. If you use an outside source or receive assistance, acknowledge it. Deliberate misrepresentation will result in no credit for the assignment; a second offense will result in failing the course. All offenses will be reported and are subject to college disciplinary action as well.

Because you are encouraged to work together and provide each other assistance, you do risk inadvertent plagiarism. Be cautious, especially when you ask for or provide assistance. Make sure that you don't let someone else do your work for you, and make sure that you don't do someone else's work. Should you discover that a program in one of the textbooks is similar enough to an assignment to provide a useful starting point, that is fine—if you understand it fully and cite it. In all cases, simply be sure that you acknowledge clearly whatever help you receive.

There are two things that you can do that will eliminate the bulk of the temptations in this area. The first is to avoid procrastination: assignments are given with plenty of time for you to ask questions in class or in my office. The second is to be careful how you ask for help: do not ask other students to tell you the solutions to assigned problems; ask questions to figure out what it is you do not yet understand and in order to understand it. (When giving help, don't be lazy and give away the answers; help your fellow students to learn.)

You are also responsible for ensuring that your work for this course isn't available for others to copy without your permission. You will need to make sure that file and directory permissions are set properly in the lab.

Special circumstances and needs Wheaton College is committed to providing reasonable accommodations for students with disabilities. Any student with a documented disability needing academic adjustments is requested to contact the Academic and Disability Services Office as early in the semester as possible. Call 630.752.5941 or email jennifer.nicodem@wheaton.edu for further information.

Gender-neutral language By vote of the faculty in April 2012, all syllabi are required to contain the following statement:

For academic discourse, spoken and written, the faculty expects students to use gender inclusive language for human beings.

Initial schedule

Here is our initial schedule; watch in class and online for updates.

Date	Reading		
Aug 28		Review and introduction	start L0 (due Sep 6)
30	ch. 1, 2.1	Memory I: Representation bits, etc.; integers	
Sep 2	<i>Labor Day</i>		
4	2.2–3	signs, arithmetic	start L1 (due Sep 16)
6	2.4–	floating-point	L0 due
9			
11	3.1–4	Processor and Programs I basic architecture, operands	
13	3.5, 3.8–9	primitive operations, structures in memory	start L2 (due Sep 27)
16	3.6	control structures	L1 due
18	3.7	functions	
20	3.10–	wrapping up instructions	
23		Memory II: Allocation stacks and heaps	
25	9.11	System Model I: Protection and Abstraction basics of input/output	
27	8.1	interrupts and exceptions, handlers	start L3 (due Oct 11) L2 due
30		Review	
Oct 2		Exam	
4	8.2	process, kernel; system call	
7	8.3–5, 8.7	process management	
9	6.1, 10.1–3	System Model II: I/O files, file descriptors	
11	10.4–	reusing the fd abstraction	start L4 (due Oct 28) L3 due
14	9.1–2, 6.2–3	Memory III: Caches and Translation Address spaces, caches	
16	6.4	Cache organization	
18	6.5–	Cache consequences	

Date	Reading		
21	<i>Quad break</i>		
22	<i>Quad break</i>		
23	9.3–9.6	Address translation	
25		practical considerations	
28	9.9–10	Memory III: Allocators	start L5 (due Nov 11)
30		data structures	L4 due
		pragmatics	
Nov 1		Review	
4			
6		Exam	
8	12.3–4	System Model III: Concurrency	
		Threads	
11		coordination	start L6 (due Dec 9)
			L5 due
13	11.1–4	System V: Networks	
		addressing, sockets	
15	11.5–	RPCs	
18		Processors II: Parallelism	
		Multiprocessors	
20		memory consistency	
22		Instruction-level parallelism	
25	start ch. 5	code improvement (optimization)	L6 milestone due
27	<i>Thanksgiving</i>		
29	<i>Thanksgiving</i>		
Dec 2		performance	
4			
6			
9			L6 due
11		What lies ahead?	
13		Review	
8:00-10:00 a.m., Wed 18 Dec		Final exam	