Syllabus
CMSC121: Intro to computer science

Spring 2017

Time:	MWF 11:00am, Ruffner 354
Website:	`http://cs.longwood.edu/courses/cmsc121/1`

An introduction to computer science for non-specialists. Basic computer architecture and design, storage formats, principles of computer operation, and algorithms. Application software that emphasizes the computer as a tool.

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Office hours:	Mondays 1–2pm; Wednesdays 4–5:30pm; Thursdays 11–12:30pm

Overview

Edsger Dijkstra[1] famously said that "computer science is no more about computers than astronomy is about telescopes." What did he mean?

In this course, we will indeed spend plenty of time with computers, but we will also spend much time without computers, working with the idea of computation itself, and discovering what it can do for us. We will study how data is processed (and how computers can help us handle more of it). We will study how information can be represented (and some of the limits imposed by storing it in a computer). And we will study computers themselves, seeing how the hardware is built, from the circuit level on up.

[0] Or `blahetadp@longwood.edu` if you'd rather, but I prefer the off-campus one and check it more frequently.

[1] A pioneer of computer science. More info available on Wikipedia.

Course objectives

At the end of this course, the successful student will be able to:

1. develop and execute algorithms for the processing of mathematical models,
2. explain the utility and limitations of abstract models for studying concrete real-world situations, and
3. compare and evaluate software and hardware systems on their appropriateness for specific tasks.

Textbook and resources

There is no textbook to purchase. Required readings will be linked from the course website.

You need to own or have access to a laptop, on which you can install software, and which you can bring to class at least on the days marked "Laptops" on the calendar. The laptop can be Windows, Mac, or Linux. It must be able to connect to LancerNet (*not* LancerNetVisitor). If you do not have a laptop, see me early in the term to make arrangements.

Content policies

Reading and homework

Most topics will have a particular reading associated with them. In general: For the first day of the topic, there will be a reading assignment and associated homework. You'll need to do the reading and the homework *before class*; and I'll check it in class. You will get 3 points (of 3) for doing it *even if your answers are wrong*—the attempt matters, and makes our in-class time much more productive. After we've explored the material in class, the next assignment will be to re-try them and practice on others. You'll have another chance to ask questions about this second round, and then I'll give a three-question, 3 point, open-notes quiz with similar problems.

Note that if you are absent from class, you will not in general be able to make up the homework check or quiz points later.

Exam structure and the final exam policy

The first two exams in this class are scheduled on the following days:

Exam 1	Fri, 3 March
Exam 2	Fri, 21 April

They will be 120 points each and have the following format:

- At the end of the last class before the exam, I'll give essay questions worth a total of 40 points. You'll bring your answers with you (on paper, either typed or written) to the exam. You can talk about these questions and bounce ideas off other students as you study for the exam, BUT you must write your actual answers yourself, and you must identify who you discussed it with. You'll be able to refer to your notes and the readings while you do these problems.

  Essay questions
  Collaborative

- The in-class part of the exam will contain a mix of multiple-choice and short-answer questions worth a total of 80 points. This part is closed-book. You may optionally use a simple four-function calculator on this part of the exam, but all other electronics (phones, graphing calculators, tablets, laptops) must be turned off and put away.

  MC, short-answer
  Non-collaborative

The final exam is scheduled at the following time:

Thursday, 4 May 11:30am–2pm

If you have a good reason to need to take the exam at another time, you must contact me in advance to make arrangements.

The final exam will have a mix of multiple-choice, short-answer, and essay questions (with no separate take-home portion). It will be cumulative, and most of the problems will be very similar to problems you saw on the first two exams, perhaps with different numbers or different answer options. In my own grade spreadsheet, I will assign a subscore to the two parts of the final; if you do better on a part of the final than you did on the corresponding earlier exam, *I will overwrite the earlier score with the new, higher, subscore*. Caveat: this only applies if you actually take the earlier exams. If you skip an exam, the zero will stand.

Grading breakdown

There are roughly 800 points available in this course; your work will be evaluated as follows:

Active involvement. You need to be an active participant in this class: present, prepared, and on-task. The points for each day will be assigned using one of the following rubrics: 10%

- Checked participation: **2**: Attentive and on-task. **1 or 0**: Substantially late, sleeping, fussing with cellphone, etc. **0**: Absent.
- Basic attendance: **2**: Present. **0**: Absent.
- I forgot to take attendance: **2**: Everyone gets 2.

I will not, in general, tell you in advance which one I'll use on a particular day. These points are collectively worth 10% of the grade.

Reading and homework. Most topics will be have readings and homework assignments, described in more detail elsewhere in this syllabus. Homework checks and quizzes collectively make up 15% of the grade. 15%

Research paper. Over the course of the term, you will write a research paper on the impact of computers on some specific area of human endeavour. There will be some intermediate deadlines; the paper will overall be worth 15% of the final grade. 15%

Exams. There will be two midterm exams, each worth 15% of the grade, and a cumulative final, worth 30%. 60%

Grading scale

I tend to grade hard on individual assignments, but compensate for this in the final grades. The grading scale will be approximately as follows:

A−	[85, 90)	A	[90, 100)	[2]	
B−	[70, 75)	B	[75, 80)	B+	[80, 85)
C−	[55, 60)	C	[60, 65)	C+	[65, 70)
D−	[40, 45)	D	[45, 50)	D+	[50, 55)

While there will be no "curve" in the statistical sense, I may slightly adjust the scale at the end of the term if it turns out some of the assignments were too difficult.

[2] Alas, no A+, unfortunately.

Calendar (tentative)

Wk	M	W	F
	January		
1		**18** — Intro Algorithms and preciseness	**20** **Laptops** Procedures (Light-bot)
2	**23** — Elements of well-specified algorithms	**25** * **Laptops** Conditionals	**27** — Operations, expressions Order of operations Algorithms with expressions
		February	
3	**30** — Spreadsheets Exprs referring to cells Parameters (abs cell refs)	**1** **Laptops** Repetition in spreadsheets	**3** **Laptops** Spreadsheet builtin functions **Paper topic/source list due**
4	**6** — Using IF and conditions (tax form)	**8** **Laptops** (Finish tax form example)	**10** — Representing text ASCII, 8 bit codes, Unicode
5	**13** **Laptops** Representing images RGB pixels (Pixel2Spreadsheet)	**15** **Laptops** Manipulating images	**17** — Place-value notation
6	**20** — Binary and hex	**22** — Converting 2-10-16 Developing algorithms	**24** ** — 2-10-16 cont'd **Paper 1 due**
		March	
7	**27** * — Fractional numbers Scientific notation Limitations of floating point	**1** — Exam review	**3** — **Exam 1**

* **25 January**: Deadline to add/drop classes (5pm)

** **24 February**: Deadline to elect pass/fail option (5pm)

Wk	M	W	F
	March		
		SPRING BREAK	
8	**13** *	**15**	**17**
	—	—	—
	Negative numbers	Negative numbers, cont'd	Basics of compression RLE
9	**20**	**22**	**24**
	—	—	**Laptops**
	Compression ratios Sliding window	Lossy vs. lossless compression Standard formats	AND, OR, NOT gates (Logisim) 2-input truth tables Simple digital circuits
10	**27**	**29**	**31**
	—	**Laptops**	**Laptops**
	Larger truth tables XOR, NOR, NAND	Circuit equivalence Converting between representations	Circuits from truth tables
	April		
11	**3**	**5**	**7**
	Laptops	—	**Laptops**
	Boolean algebra	Reducing boolean expressions	Circuit design and simplification **Paper 2 due**
12	**10**	**12**	**14**
	—	—	—
	Parts of a computer	Evaluating systems	Error detection (parity bits, Luhn)
13	**17**	**19**	**21**
	—	—	—
	Error correction (2D parity)	Exam review	**Exam 2**
14	**24**	[Showcase day **no class**]	**28**
	Laptops		**Laptops**
	Event-based programming (Scratch)		Using variables Writing a simple game
	May		
15	**1**		
	Laptops		
	More programming General review		

Exam 2: Thu 4th, 11:30am–2pm

* **13 March**: Deadline to withdraw from a class (5pm)

General policies

Support

This is an introductory course. That means that what is covered is a starting point for other work in the field, *not* that it is supposed to be obvious, or easy. So don't feel bad if something doesn't click right away. Never hesitate to ask me a question; I'll usually at least give you a hint as to where to look next.

I figure I have about 8–10 hours of your time every week, including class time as well as reading and homework. If you find you're spending more time than this, please let me know, and we'll see what we can work out.

I'm in my office a lot (not just during posted office hours). Feel free to come in and ask questions (or just to talk). If you can't catch me in my office, email is probably your best bet.

Accommodations

If you have any special need that I can accommodate, I'm happy to do so; come speak to me early in the term so we can set things up. If you have a documented disability, you should also contact Longwood's Office of Disability Resources (Graham Hall, x2391) to discuss some of the support the college can offer you. All such conversations are confidential.

Honor code policy

Above all, I ask and expect that you will conduct yourself with honesty and integrity—and not to ignore the other ten points of the Honor Code, either. Take pride in what you are capable of, and have the humility to give credit where it is due.

The two main forms of academic dishonesty are "cheating" and "plagiarism". "Cheating" is getting help from someplace you shouldn't, and "plagiarism" is presenting someone else's idea as if it's your own. If you ever find yourself inclined towards either of these, know that there are always other, better options. Persevere! See my website[3] for some discussion and

[3] `http://cs.longwood.edu/~dblaheta/collab.html`

examples of how to steer clear of these problems, and feel free to come talk to me if you need help finding some of those other options (even if it's for another course).

Cheating or plagiarism (on any assignment) will normally receive a *minimum* penalty of a lowered *course* grade, ranging up to an F in the course. Cases will also be turned in to the Honor Board. But: I believe in your potential, and I hope that you will, or will grow to, observe this policy not simply to evade punishment but positively as a matter of character.

Attendance and late policy

Attendance is required, and assignments must be turned in on time. That said, if you have a good reason to miss class or hand something in late, I tend to be fairly liberal with extensions if you ask in advance. (Good reasons do include assignments due for other classes.) (And medical and family emergencies are exempted from the "in advance" part, of course. But contact me ASAP.)

Frequent absence will result in a lowered participation grade; habitual absence may in extreme cases result in a failing grade for the class. *Unexcused* late assignments will normally be given a zero.

Inclement weather policy

I don't plan to cancel class for weather unless the entire college shuts down. If you are commuting or are otherwise significantly affected by a weather event, use your own best judgement; and if you do miss class for this reason, contact me as soon as possible to make up missed work.

Early bird policy

Nobody's perfect, and on occasion an assignment gets written a little unclearly (or, once in a while, with an actual error in it). If you catch one and bring it to my attention early, so that I can issue a clarification or correction to the rest of the class, there'll be some extra credit in it for you.