Syllabus
CMSC 360: Computer network theory

Fall 2021

Time:	TR 2:00
Room:	Rotunda 352
Website:	`http://cs.longwood.edu/courses/cmsc360/`

A course covering the theory and design of modern computer networks. Topics include local and wide area networks, the OSI network model, basic network performance analysis, and real time networks.

Professor:	Don Blaheta
Office:	Rotunda 334
Phone:	x2191
Email:	`blahetadp@longwood.edu`
100% office hours:	Tuesdays 10–11am; Wednesdays 3-4:30pm; Thursdays 1–2pm; Fridays 11am-noon; (see note below)

Overview

Twenty-five years ago, computers in offices or labs might have network access to a file server, some home PCs had dialup access to an online service, and the Internet was still largely the province of universities and a few tech companies; now millions of people routinely watch movies over the Web on a computer they carry in their pocket. In this course we will cover many of the current protocols and designs, both old and new, that underlie that ubiquitous networking revolution.

Textbook and resources

There is no required textbook that you need to buy. There are some networking textbooks in the ACL library that you can refer to, and I will expect you to make active use of web resources as well.

All our implementations will be done on the departmental Linux systems. If you don't have an account or have forgotten your password, see me soon

to get this resolved.

Covid-19 notes

There are a number of policies specific to running a class in a pandemic that I wanted to put early in the syllabus to get your attention.

Attending class. There are two ways you can attend class: in person, or via Zoom link. Either mode of attendance is equivalent for purposes of evaluating your presence and participation; if you attend via Zoom link,

- you must have a reason, and
- you must say what it is,

but I don't need any medical detail and if it's not directly covid-related I'm not going to police that. (Basically: be an adult and make good choices.) Unlike last year, I can't promise that the Zoom experience will be anywhere near equivalent to the in-person experience; in fact, it almost certainly won't be. But if you are quarantined, or otherwise just can't attend in person on a particular day, zooming is better than total absence.

If you are on Zoom on a day that you present something, I *will* expect you to connect with video, at least for that part, unless you have contacted me *in advance*.

Important note: I will not necessarily turn on the Zoom link for every class day unless I know for sure someone will be attending that way. Try to get word to me that you'll need to zoom as soon as you know.

Medical needs. There are a number of medical reasons why attending class in person may not be appropriate for you. Obviously, if you receive a positive Covid-19 test, you will need to remain in isolation and attend class via Zoom link. Even without a positive confirmation, if you are feeling some symptoms or have been exposed or are awaiting test results, attending via Zoom link from quarantine is most appropriate (*especially* if you are unvaccinated).

> **More serious medical needs.** If you are feeling serious symptoms of Covid-19 (or some other sickness), your priority should be on dealing with that. If you end up missing class sessions

and/or assignments due to being sick, notify me when you can and then let me know when you're on the upswing so we can plan out how to get you caught up.

Wearing a mask. As of the start of the semester, all students attending class in person must be wearing a mask or other appropriate face covering. Coverings that are acceptable include some kinds of folded bandannas, gaiters, or scarves, as long as: it covers both your nose and mouth, with two layers of cloth, fitted relatively snugly around the edges, and reduces aerosols (i.e. it's relatively tightly woven, not very stretchy, and doesn't have an "exhaust port"). If you show up to class without a face covering, you will be required to put one on or leave. If you are medically unable to wear a mask, please contact the Accessibility Resources Office to help you work out an accommodation.

It is possible that the university's masking rules will relax at some point. Even if/when they are not generally required, I will encourage you to wear a mask if you are unvaccinated, if you are mildly symptomatic (e.g. "it's probably allergies but just in case"), or if it makes you feel safer or more comfortable to do so.

All-online? It's still slightly possible that at some point in the semester we'll have to move all-online to handle an outbreak (or that *I* will land in quarantine). Should that happen, we will migrate the course to Zoom meetings but otherwise carry on. I expect that this course will remain largely synchronous (i.e. we meet at our regular class time) even if we go remote, but some calendar dates may be adjusted.

Course outcomes

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

1. identify the layers of the OSI and TCP/IP architectures and explain their respective roles;
2. write client/server programs that communicate via TCP/IP;
3. read and implement a protocol specification;
4. understand and explain principles of network addressing and routing.

Content

Graded assignments

I figure that I have on average about 9 hours of your time every week, including class and lab time as well as reading, practice, homework, and projects. If you find you're regularly spending substantially more time than this, please do come discuss it with me, so that we can ensure you're making the most effective use of your time. The work you do for this course will be evaluated as follows:

Engagement. You need to be actively engaged in this class. Engagement comes in many forms, but I expect that you will be interacting with your classmates, and with me, in class. General engagement will be evaluated in two-week blocks—so you don't need to artificially say a thing every day—and it's ok if most of your engagement is via the discussion boards as long as *some* of it is spoken out loud. In addition, there will be occasional required interactions via Canvas that will be considered part of the engagement grade. Engagement makes up 5% of the course grade.

Homework and projects. There will be a mix of assignments, including some intended for more short-term work ("homework") and some that will require a bit longer to develop and complete, with a larger design component ("projects"). These will collectively be worth 55% of the grade.

Exams. There will be two take-home exams, one at the beginning of October and one during the finals period. The final will not be explicitly cumulative, though of course the material from the second half of the course builds on the earlier stuff. Each exam is worth 20% of the grade.

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, 95)	A+	[95, 100]
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. Final grades of A+ are recorded as an A in the grading system. Final grades below the minimum for D− are recorded as an F.

Note that *individual* grades recorded in Canvas should be accurate (and you should let me know if there's a data entry error!), but *averages* as computed by Canvas sometimes are not, if the averaging is complex or (especially) if an individual student has a special case scenario. The reference gradebook is my own spreadsheet, and while I will try to make Canvas reflect it (including averages) as well as I can, Canvas can't always handle it.

Calendar

The job of a network, broadly, is to get the message there, intact and secure. The units of the course correspond to the four parts of that job:

Unit 1: the message (encoding and decoding)
Unit 2: there (routing and addressing)
Unit 3: intact (error detection/correction)
Unit 4: secure (secrecy and authentication)

Week 1	Introductions; protocols and layers; information theory
Week 2	Message assembly at the Physical & Data Link Layer
Week 3	Message assembly at the Application Layer
Week 4	Protocol design: text vs binary
Week 5	Routing and addressing at the Data Link Layer
Week 6	Network layer routing algorithms
Week 7	Network routing, continued
	(Fall Break 7 Oct)
Week 8	Application layer routing (tunneling etc)
	(Exam 1 out 14 Oct, due Tue 19 Oct)
Week 9	Error detection at the Physical & Data Link Layer
Week 10	"Reliable transport" (TCP)
Week 11	Error detection vs error correction
Week 12	Physical network security
Week 13	(Symposium Day 16 Nov)
	Network & Transport security
Week 14	Network & Transport security
	(Thanksgiving 25 Nov)
Week 15	Application layer security
	(Exam 2 out 3 Dec, due Wed 8 Dec @2pm)

Other dates:

31 August: Deadline to add/drop classes (5pm)
1 October: Deadline to elect pass/fail option (5pm)
3 November: Deadline to withdraw from a class (5pm)

Policies

You can find several university-wide course policies at
`http://www.longwood.edu/academicaffairs/syllabus-statements/` .

"Office hours"

If I'm in my office and my door is open, that means I'm available for you to drop in and ask questions, and I probably also have my "office hours" zoom link active, which means you're free to join me that way instead. At least four hours a week I've designated as 100% hours, i.e. there's a nearly 100% chance I'm available at those times.

But I'm in my office a lot and I'd like to effectively communicate to you when you're most likely to catch me, so if you look at my office schedule on my website or linked from Canvas, you'll also see many hours listed with other percentages like 60% or 40 or 10, as informal estimates of the probability I'll have office hours in that block for drop-in questions. (If you want more certainty, you can always give me advance notice and be extra sure I'll be there at whatever time!)

If you can't catch me in my office, email is probably your best bet.

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[1] for some discussion and 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).

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

Cheating or plagiarism (on any assignment) will normally receive a *minimum* penalty of lowering the *course* grade by a full letter, and may range at my discretion 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.

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 Accessibility Resources Office (Brock Hall, x2391) to discuss some of the support the college can offer you. All such conversations are confidential.

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.