COMM 4557 Communication Network Infrastructure

Autumn 2025 – Last updated 8/24/2025

Lecture: Journalism Building 216
T/H 12:45pm – 2:05pm

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Rationale and objectives

This course provides a foundational understanding of telecommunication technologies, equipping students to explain how modern communication systems function and evolve. Through topics ranging from analog radio broadcasting and the public switched telephone network (PSTN) to streaming media and encrypted Internet communication, students will explore both the capabilities and inner workings of contemporary systems. Key questions—such as how sound travels over telephone lines, how data flows across the Internet, and how cellphone calls differ from FaceTime—guide our inquiry. We also examine how digital technologies impact privacy and society. Special attention is given to the distinctions between analog and digital systems, encouraging students to think critically about design choices, technical constraints, and the broader implications of networked communication.

Specific Learning Objectives:

With these skills, you will be better prepared to
- Explain technologies to those who are less knowledgeable,
- Read tech news, and
- Think critically about key capabilities and limitations of existing and novel telecommunication systems.

Course Prerequisite

Comm 2540: Introduction to Communication Technology

Required Text

Newton, Harry with Steve Schoen. (2022). *Newton's Telecom Dictionary* (32th ed.). New York: Telecom Publishing. ("Newton" in schedule)

All other required readings are available through CARMEN.

Copyright Disclaimer: The materials used in connection with this course may be subject to copyright protection and are only for the use of students officially enrolled in the course for the educational purposes associated with the course. Copyright law must be considered before copying, retaining, or disseminating materials outside of the course.

<u>Policies and Expectations</u>

Class communication. I will post class updates and/or additional materials as announcements on Carmen and/or to your OSU email. Please check Carmen and read your email regularly (at least 2-3 times per week) because you are responsible for this information, just as you are responsible for information presented in class.

In-person attendance & participation. While sickness and unexpected emergencies arise from time to time, *regular* absence will hurt your grade. I routinely evaluate participation via graded in-class activities. For example, you may be required to upload materials to Carmen or take a poll with TopHat. This work cannot be made up.

That said, **please do not attend class if you are feeling sick**. As important as the in-person experience is to your learning, it isn't worth spreading an illness to your classmates. If you are unable to attend class because you are sick, don't panic! Most students are able to complete a successful semester despite illness-induced absence. If you are absent due to illness, including but not limited to COVID, I will provide you a reasonable opportunity to make up missed work. **You do not need to provide a physician's document of illness, but you should advise me via email as soon as you are safely able to do so.**

Punctuality. Classes begin on time every day so that all scheduled discussions and activities can be completed. You are expected to be punctual. Entering the classroom after we've begun is disruptive and disrespectful.

Lecture slides. I plan to post lecture slides on Carmen after each class session. I hope that doing so will make it easier for you to focus on the ideas being discussed in lecture rather than trying to transcribe everything that I say.

Lecture recordings. If I know that someone will miss a lecture due to illness, I will try to record the audio of my lecture (often paired with a video of the slides). I want to make it as easy as possible for those who are forced to miss class to catch up. Note, however, that such recordings may fail to capture in-class activities, they may be incomplete in other ways, or they be entirely missing (e.g., in the event of a problem with the recording technology).

Problem Sets. Problem set due dates are listed in the tentative schedule, below, and on Carmen. They must be submitted by the start of class on the due date and must be turned in via Carmen using Carmen's built-in text editor. I do encourage you to prepare your answers in a word processor, though, copy-and-pasting them into the text editor. Doing so will make it easier for you to prepare your corrections, which I describe in more detail below. Please also make sure you understand the rules regarding your use of AI.

Late Assignments. It is your responsibility to confirm that your assignment has been successfully uploaded to Carmen. Problems sets will not be accepted after the start of class on the due date. (As noted above, I will make accommodations for illness.)

Challenging a Grade. I am always willing to discuss your grades with you, but I will not do so during class time. To challenge a grade, you must wait 24 hours after the assignment is graded and then email me to make an appointment *within one week* of the assignment being returned to you. When we meet, you must present your concerns in writing and attach the graded paper. Please note that a challenge may result in grades being raised or lowered.

Academic integrity policy. It is the responsibility of the Committee on Academic Misconduct to investigate or establish procedures for the investigation of all reported cases of student academic misconduct. The term "academic misconduct" includes all forms of student academic misconduct wherever committed; illustrated by, but not limited to, cases of plagiarism and dishonest practices in connection with examinations. Instructors shall report all instances of alleged academic misconduct to the committee (Faculty Rule 3335-5-48.7 (B)). For additional information, see the Code of Student Conduct.

Please note that although collaboration is required throughout this course and cooperation is encouraged, any work submitted by a student for academic credit must be your own work. You are encouraged to study with classmates and to discuss information and concepts covered in lectures with other students. You can give "consulting" help to or receive "consulting" help from such students. However, cooperation should never involve one student having possession of a copy of all or part of work done by someone else, in the form of an e-mail, file exchange, a hard copy, or anything else.

Generative AI. You may not under any circumstances use generative AI (e.g., ChatGPT, Google Gemini, Microsoft Copilot) to produce the content that you submit in this class, including discussion board posts and problem sets.

At the same time, I encourage you to use the technology to help you understand and practice using class concepts when working on learning exercises, such as discussion board posts and problem sets. If you do use generative AI, you must write your answer on your own. No copy-and-pasting or close paraphrasing of material produced by the software. And if you use generative AI to help you think about how to answer a question, you must also include the prompt that you used in your assignment submission.

Again, any material you submit must be written in your own words and your use of generative AI clearly documented.

You may not under any circumstances use generative AI during an exam or other evaluation of what you've learned.

If I suspect that a student has committed academic misconduct in this course, I am obligated by University Rules to report my suspicions to the Committee on Academic Misconduct. If COAM determines that you have violated the University's Code of Student Conduct (i.e., committed academic misconduct), the sanctions could include a failing grade in this course and suspension or dismissal from the University.

It is your responsibility to be aware of the rules of academic dishonesty—ignorance is not a defense. ***When in doubt, talk to me.***

Course Technology

This being a class about communication technology, I expect you to be able to use a variety of technologies when participating in this class. Email, CarmanCanvas, TopHat, and Zoom will be used most often, but other technologies may be introduced from time to time. I expect you to familiarize yourselves with these technologies and to be able to use them for our class. If you need help, please consult the various support services offered by OSU and the service providers (see below). If those resources are insufficient, please do not hesitate to ask me for help.

As noted elsewhere in this syllabus, active participation in the class is critical to your ability to learn the course material. This means that you must resist the temptation to do any of the many other things that your computer makes possible. Stop checking your email, texts, and social media feeds. I know this can be hard, but it will make a significant difference your ability to learn this material. Plus, it is an invaluable life skill. Trust me when I tell you that your friends, your family, your future employer—anyone you interact with regularly—will appreciate your ability to ignore the siren song of social media for an hour and twenty minutes at a time.

Required technology. You will need access to a computer with Internet access. With this, and your OSU credentials (lastname.# and password) you will be able to use Microsoft Office 365, which includes Word (good for preparing assignments), PowerPoint (good for reviewing slides), Copilot, Google Gemini, and Google NotebookLM (three privacy-protected AI tools). See below for more details.

Technology support. For help with your password, university e-mail, Carmen, or any other technology issues, please contact the OSU IT Service Desk.

- Self-Service and Chat support: http://ocio.osu.edu/selfservice
- Phone: 614-688-HELP (4357)
- Email: 8help@osu.edu
- TDD: 614-688-8743

More information about technologies we will use most often in this class is provided below.

CarmenCanvas (aka Carmen): OSU's Learning Management System, Carmen, will be used to host materials and activities throughout this course. To access Carmen, visit http://carmen.osu.edu. Log in using your name.# and password. Carmen documentation can be found here: https://teaching.resources.osu.edu/toolsets/carmencanvas.

TopHat: Some in-class activities will use TopHat to provide real-time sharing of comments, poll results, etc. The service can be accessed with a web browser (https://tophat.com/) or an app (available for both Android and iOS).

CarmenZoom (aka Zoom): Office hours will be conducted using Zoom. The link for accessing my Zoom office hours can be found at the top of this syllabus. You can access the service via the Google Chrome web browser or using the Zoom app.

More information about Zoom is available here: https://teaching.resources.osu.edu/toolsets/carmenzoom.

Honorlock: Exams will be conducted in the classroom using Carmen with Honorlock enabled. Honorlock only works with Windows and Apple computers; it does not work with tablets (so iPads will not work). It also requires that you use the Google Chrome browser with the Honorlock extension installed. It also has a variety of other technical requirements (e.g., you can only use one screen, you must disable adblockers, etc.) **Given the many technical requirements, it is important that you confirm that the software works on your computer before taking the exam.**

If you are taking the exam remotely (this is *very* unlikely; see the section about exams), you will be required to have a webcam with a microphone and a reliable Internet connection. You will not be permitted to take remotely proctored exams in your home or residence hall unless you are willing to conduct a room scan. By choosing to take the exam at home or in a residence hall, you are consenting to the room scan of the area in which you take the exam. Honorlock will also record the testing environment while you take your exam, so it is important that you find a space where disruptions are unlikely and where you can enable video recording.

To use Honorlock you must be over 18 years of age. If you have concerns about using an online proctoring tool, please contact me as soon as possible so that we can find a workable alternative.

Microsoft Copilot: Copilot is Microsoft's generative AI tool, and it is available to all students at OSU. Generative AI can be a powerful tool, but it takes time to learn to use it effectively. As noted in the section on Academic Misconduct, abuse of the technology has serious consequences.

For this class, I think one of the more interesting ways Copilot can help you is by serving as a tutor, answering your questions about important class concepts. How effectively it does this depends greatly on the "prompt" that you provide when interacting with the system. Here is an example of a Copilot prompt that you could use to better understand the concept of waves and signals.

```
Your goal is to teach the user about telecommunications systems. Your
tone should be educational but friendly and your explanation should be
geared toward undergraduate users with limited technical expertise.
Explain the relation between electromagnetic waves and
telecommunication signals in one small paragraph. Provide examples that
illustrate different waveforms and different types of signals. If the
user asks follow-up questions, maintain the educational tone and
provide more examples when possible.
```

You might then follow up with questions like this:

```
How does changing the waveform alter the signal?
Why are some waves better than others when communicating?
```

Course Requirements:

Course readings are essential to full participation. Doing the readings and reflecting on what you've read is required for this class. My lectures, our discussions, and the in-class activities all take this for granted. Required readings are listed in the tentative schedule, below. Although some of the readings come from a traditional textbook, we also make

extensive use of popular web sites, including HowStuffWorks, Wikipedia, and YouTube. You should read *all* sections of the page or entry, or watch the entire video, unless I indicate otherwise. If you encounter terms you don't understand, please consult Newton's Telcomm dictionary (which is the only required textbook). I also encourage you to pursue links on these sites if there are terms or topics that you do not understand or want to know more about.

Please be aware that although I have reviewed the online sources and consider them to be reliable, the content can change without notice and the entries may sometimes contain errors. Cross checking the information you find here with the dictionary and lecture is strongly encouraged.

Discussion posts. There are two types of posts that you are required to make between class sessions.

First, <u>once each week</u> you must post a comment or question about the reading at least one hour before the associated lecture. It can be a question you want help answering, or one that your classmates could answer based on what they read. You may also pose a comment connecting the technology discussed in the reading to current events. **Credit is given based on evidence that you have completed and thought about the readings.**

Second, <u>once each week</u> you must post at least one review question related to the material covered in lecture on <u>the day after a class lecture</u>. This can take the form of a question that you need help answering, or a question that your classmates could use to test their understanding of the material. To get credit for this post, the question must be clearly connected to the prior lecture and must illustrate your understanding of the larger topic. **Saying that you understood everything is not sufficient.**

Note that **you may <u>not</u> simply repeat a classmate's comment** when making either of these types of posts. If someone has already written what you were planning to write, you must write something else. You may post a different question, or you may reply to the post with a response to, or an elaboration on, the question.

Here's an (intentionally silly) example:

> **Student.1:** The author says that red Skittles reflect lower wavelengths than blue Skittles. I understand that wavelengths and colors are related, but what does he mean when he says that the waves are "reflected"
>
> **Student.2:** I had a similar question to @Student.1. I think that we see "reflected" light, but I'm not sure why the two candies don't reflect the same light.

Missed posts cannot be made up, but you can miss up to <u>four</u>, two before-class and two after-class, with no penalty. That means that over the course of the semester, you will have to submit at least 10 good quality before-class and 10 good quality after-class posts to earn full credit.

In-class exercises. There will be a variety of in-class exercises. Like the problem sets, the goal of these exercises is to help you improve your understanding of class material. The exercises also help me to understand what topics are most confusing to the class. Some of the exercises will be completed in small groups, but unless I say otherwise, you are expected to turn in your own attempt at a solution. As mentioned elsewhere in this

document, we will use a variety of different technologies to submit these materials, though TopHat will be commonly used.

As with posts, missed in-class exercises cannot be made up. You can, however, miss up to three days with no penalty.

Problem sets. The point of the problem sets is to help you learn, not to assess what you've learned. Because of this, grading might be a little different than you are used to so please read this section carefully!

Each problem set has two stages:

(1) In the first stage you are to answer **all** parts of the problem set to the best of your ability. **Your answer must also include an indication of which class material supports your answer.** This might be a reading (by source and page number) or lecture (by date and slide number). If there is a question that you do not know how to answer, I encourage you to seek help from me, a classmate, even Copilot. How ever you get help, you'll have to note that in the work you submit. As a reminder, if you use generative AI, you must also include the prompt(s) you used in the material you submit. You may also ask questions at the start of lecture, and I encourage you to come to my online office hours. If you still do not understand well enough to answer the question, **you must explain the parts you do understand**, describe what is confusing you to the best of your ability, and indicate which class materials you reviewed when trying to answer the question.
I know that you can find solution sets to (old versions of) these problem sets online if you try. But that is not a good use of your time! You will learn more by trying to answer the questions on your own. For this part of the problem set, you grade is based on your effort. **You won't lose points for answering incorrectly.**

(2) After the submission deadline, I will provide a solution set on Carmen. You will then have **one week to correct the answers you submitted in the first stage**. When correcting your assignment, do not just copy the answers provided on the solution set. To get full credit for the correction, you must:

- **Leave your original answer.** Please indicate your errors by crossing out the mistake. (~~Like this~~.) Do not delete any part of the original.

- **Describe the problem** with the original answer and explain how your new answer fixes this problem. (In other words, do not just copy the solution set.) If your answer is correct, say this explicitly. If it is correct but differs from my answer, explain why.

- **Correct and explain all your errors.** As with the first attempt, your correction must indicate which class reading(s) and/or slide(s) provide information that supports your correction.

Please make any text that you add bold and red.

Here's an (intentionally silly) example:

1. Cookie Monster is ~~green because of all the leafy green vegetables he eats (YouTube video *Cookie Monster or Veggie Monster: You Decide*)~~. **The crossed-out text is incorrect. Cookie Monster is blue, not green. Although I don't**

know why he is this color, it is certainly not because of his healthy eating habits. That monster doesn't eat anything but cookies. Information confirming this correction can be found in Michael Davis's history of Sesame Street, *Street Gang*, in the section that begins "There was a brief period during which Cookie Monster had neither an obsession nor a permanent name."

Each assignment is worth **four point**. (a) You get **two** points for answering all questions as completely and accurately as possible on your first attempt. If you have spoken to me, but are still stuck, then you should answer as much of the question as you can and explain what part of the question is tripping you up. Again, your answer does not have to be correct to get full credit! (b) You get **two more** points for correcting your first attempt and explaining all your errors.

Exams. There will be a midterm and final exam. The midterm will encompass all material covered in the class prior to the exam. The final will be a comprehensive exam, covering all the topics of the course. You should be prepared to answer multiple-choice and short-answer questions on both exams. I will provide more information about the exams later in the semester.

Both exams will be conducted in person using Carmen and Honorlock, OSU's digital proctoring tool. Please ensure that this software works on the computer that you will use to take the exam by taking the ungraded "quiz" set up for testing purposes. I encourage you to verify that it works at least two weeks prior to the scheduled exam date. This will give you some time to work out any technical difficulties that you encounter. (For more information, see the section on Course Technology.)

In some very rare circumstances (e.g., out of medical necessity), a student may be allowed to take the exam remotely. This must be arranged with me in writing well in advance of the exam. Please ensure that the software works wherever you plan to take the exam. (For more information, see the section on Technology.)

You may request an in-person proctoring alternative to Proctorio. If you want to do so, please contact me as soon as possible to coordinate the accommodation.

<u>Grading</u>

In-class participation	5%
Before-class discussion board posts	5%
After-class discussion board posts	5%
Problem sets	25%
Midterm	30%
Final	30%

Grading scale
93–100: 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+
60–66.9: D
Below 60: E

Other Policies

All standard OSU policies apply to this course, including the university's policies on:
- Academic misconduct
- Artificial Intelligence
- Religious accommodations
- Disabilities
- Intellectual Diversity
- Grievances and Solving Problems
- Creating an Environment Free from Harassment, Discrimination, and Sexual Misconduct

These policies can be view on the Office of Undergraduate Education's Standard Syllabus Statements webpage.

PLEASE TAKE CARE OF YOURSELF (Mental Health Statement):

As a student you may experience a range of issues that can cause barriers to learning, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance or reduce a student's ability to participate in daily activities. The Ohio State University offers services to assist you with addressing these and other concerns you may be experiencing.

If you or someone you know are suffering from any of the aforementioned conditions, you can learn more about the broad range of confidential mental health services available on campus via the Office of Student Life's Counseling and Consultation Service (CCS) by visiting ccs.osu.edu or calling 614-292-5766. CCS is located on the 4th floor of the Younkin Success Center and 10th floor of Lincoln Tower. You can reach an on-call counselor when CCS is closed at 614-292-5766 and 24-hour emergency help is also available through the 24/7 by dialing 988 to reach the Suicide and Crisis Lifeline.

Additional Resources:

Walter E. Dennis Learning Center (http://dennislearningcenter.osu.edu/). This is a free service available to all OSU students, and it has a proven track record of helping students succeed in college. Need a new study strategy? Better time management skills? This is the place to go.

Student Academic Services (http://advising.osu.edu/welcome.shtml). The Arts and Sciences Advising and Academic Services' website provides support for student academic success. Information on advising issues such as tutoring, transfer credits, academic standing, and contact information for Arts and Sciences advisors can be found through this website.

Student Advocacy Center (https://advocacy.osu.edu/, 614-292-1111, advocacy@osu.edu). If you are facing a crisis, such as a long-term illness, serious injuries, mental health problems, or food/housing insecurity, please reach out to the Student Advocacy Center. The Center offers a variety of support services, including a student emergency fund, and can connect students with other resources around campus.

Food Security (https://www.buckeyefoodalliance.org/, 614-688-2508). The Ohio State University is committed to ensuring that all students have access to adequate and healthy food. Any undergraduate or graduate student with a BuckID may confidentially use the Buckeye Food Alliance food pantries. No proof of need is required. The pantry is located in the Monda Student Resource Center in the Younkin Success Center (1640 Neil Ave). Check the website or call for current hours.

Tentative Course Schedule

NEWTON refers to *Newton's Telcomm Dictionary*, which is required for this class
TELCOM refers to excerpts from Goleniewski's *Telecommunication Essentials*, posted on Carmen.
<u>REMINDER:</u> Two discussion posts are required for each class session, one before lecture and one on the following day. See the Course Requirements section for more detail.

Date	Topics	Readings	Assignment
T 8/26	Syllabus & Overview	This syllabus	See REMINDER, above
H 8/28	Waves	NEWTON: electromagnetic energy through electromagnetic wave (including all entries in between), signal, waveform, wavelength, frequency, hertz, amplitude, phase, sound, sound waves, and *any terms in the other readings that you don't know. (This is always required.)* http://www.youtube.com/watch?v=-oGwFDQNJps http://science.howstuffworks.com/humans-hear-in-space1.htm http://en.wikipedia.org/wiki/Waveform (Intro only) http://en.wikipedia.org/wiki/Frequency http://en.wikipedia.org/wiki/Amplitude (stop at "Peak-to-peak amplitude") *Optional:* Real-world expression of audio waveforms https://www.youtube.com/watch?v=bHu8da-wQyc	
T 9/2	Signals	NEWTON: Fourier's theorem, filter (defn 1), bandpass, signal level, signal booster, signal repeater, signal decay https://pediaa.com/difference-between-sound-waves-and-electromagnetic-waves/ https://www.wired.com/2014/06/the-fourier-theorem-science-of-music-acoustics/ https://youtu.be/spUNpyF58BY (through 2m 30s) https://en.wikipedia.org/wiki/Audio_filter (stop at "Self-oscillation")	

Date	Topics	Readings	Assignment
H 9/4	Modulation	NEWTON: modulation, modulated wave, modulator, modem, demodulation, demodulator, amplitude modulation, frequency modulation, bandwidth, noise, spectrum, (signal-to-noise ratio is missing in 32nd edition) TELECOM: 11 (at Spectrum) – 18 (before Transmission) http://en.wikipedia.org/wiki/Bandwidth_(signal_processing) (Introduction and Overview) http://en.wikipedia.org/wiki/Modulation (Just Introduction) http://en.wikipedia.org/wiki/Amplitude_modulation (Sections: Intro and History; look at Fig. 1) http://en.wikipedia.org/wiki/Frequency_modulation (Sections: Intro and Applications|Radio; look at animation) *Optional:* https://www.cancer.gov/about-cancer/causes-prevention/risk/radiation/cell-phones-fact-sheet	
T 9/9	Transmission Basics	NEWTON: frequency division multiplexing, signal converter, radio, radio conformance test, radio frequency, frequency band, diffraction, spectrum congestion, spectrum designation of frequency, spectrum management, propagate, propagation, propagation time TELECOM: 1 - 11 (before Spectrum), 23 (first paragraph of multiplexing), 26 (just FDM) http://en.wikipedia.org/wiki/Multiplexing (Introduction and Types|Frequency-division multiplexing) http://electronics.howstuffworks.com/radio-spectrum.htm (All three pages of entry) https://en.wikipedia.org/wiki/Cellular_frequencies_in_the_US *Optional:* https://youtu.be/FWCN_uI5ygY	Problem set 1

Date	Topics	Readings	Assignment
H 9/11	Digital basics	NEWTON: analog, analog signal, analog recording, analog transmission, digital, digital signal, digital recording, digital transmission, binary number system, binary notation, binary, bit TELECOM: 18 - 23 (including Table 1.1) http://computer.howstuffworks.com/bytes.htm (all four pages of entry) http://electronics.howstuffworks.com/analog-digital.htm (whole entry, which has five sections) http://games.penjee.com/binary-numbers-game/	
T 9/16	Digital Representation	NEWTON: analog digital converter, analog circuit (and circuit if needed), ASCII (there's a typo in the 32nd edition; this is under the heading ASCII-Assisted Routing; just ignore the first sentence), bits versus bytes, encoding, PCM, sampling, sampling frequency, sampling rate, quantization, Nyquist Theorem, codec, bit rate, bits per second TELCOM: 160-161 (Coding schemes: ASCII...) https://www.tutorialspoint.com/digital_communication/digital_communication_pulse_code_modulation.htm (stop at Basic Elements of PCM) https://youtu.be/YJmUkNTBa8s?t=6s through 2m 15s *Optional:* https://youtu.be/wn71QBApCRg (explains PCM and includes a review of several class concepts)	Problem set 1 corrections & Problem set 2

Date	Topics	Readings	Assignment
H 9/18	Digital Representation, part 2	NEWTON: bitmap, raster graphics, pixel, bit depth, bits per pixel, vector images, aliasing noise TELECOM: 390-396 (before Television Standards) http://preservationtutorial.library.cornell.edu/intro/intro-01.html (All 8 pages of "1. Basic Terminology" section) https://en.wikipedia.org/wiki/Raster_graphics https://en.wikipedia.org/wiki/Vector_graphics Try opening the sample images in a new window and zooming in as much as you can https://matthews.sites.wfu.edu/misc/DigPhotog/alias *Optional*: https://www.youtube.com/watch?v=1LZWCSKj45g	
T 9/23	Compression & Brief intro to Cryptography	NEWTON: compression, compression algorithm, compression artifacts, digital compression, encryption, encryption algorithm, encryption key, cipher, ciphertext, non-repudiation TELECOM: 375 (at Encryption) - 381 http://computer.howstuffworks.com/file-compression.htm (whole entry, which has 3 sections) http://computer.howstuffworks.com/encryption.htm (first four pages of entry)	Problem set 2 corrections & Problem set 3
H 9/25	Cryptography	NEWTON: public key encryption, challenge-response, RSA (defn 2) http://youtu.be/EPXilYOa71c *Optional:* If you want to know more about the math http://youtu.be/IY8BXNFgnyI http://youtu.be/cJvoi0LuutQ Also see the other Khan Academy encryption videos: https://www.khanacademy.org/math/applied-math/cryptography	

Date	Topics	Readings	Assignment
T 9/30	Digital data transmission	NEWTON: Parity, parity bit, Time Division Multiplexing, network, LAN, host, host computer, hub, router, Ethernet, Wi-Fi, Wi-Fi access point TELECOM: 26-27 (TDM), 164, 173-177 (stop at LAN Transport Techniques), 182-184 (stop at Shared Versus Switched), 215 - 219 (Packet-Switched Networks) http://en.wikipedia.org/wiki/Multiplexing ("Type|Time-division multiplexing" only)	Problem set 3 corrections & Problem set 4
H 10/2	Digital network performance	NEWTON: propagation delay, latency, cache, streaming, steaming audio, streaming media, streaming video	
T 10/7	Connecting to the Internet	NEWTON: Internetworking, broadband, cable Internet, cable modem, Internet cable access, fiber, fiber to the curb, fiber to the most economical point, FTTA-FTTx TELECOM: 388 - 390 (stop at Digital Video), 529 http://computer.howstuffworks.com/cable-modem.htm (whole entry, which has 10 sections) http://computer.howstuffworks.com/fiber-to-the-home.htm (whole entry, which has 3 sections) https://en.wikipedia.org/wiki/Fiber_to_the_x (stop at "Deployments") https://broadbandmap.fcc.gov/home (Note: Doesn't always work) https://www.fcc.gov/reports-research/maps/tract-level-residential-fixed-connections-jun-2022/	Problem set 4 corrections & Problem set 5
H 10/9	Review & exam prep	Wrap up unfinished topics Review for midterm	
T 10/14		**Midterm**	
H 10/16	Autumn Break	No Class	

Date	Topics	Readings	Assignment
T 10/21	Internet Protocol stack	NEWTON: protocol, protocol stack, OSI reference model, OSI standards TELECOM: 165 (OSI Reference Model) - 171, 264 - 269 (before Addressing Schemes) *Optional:* Recreating the 1990s dialup Internet experience https://go.osu.edu/CcKj AOL finally ended its dial-up service in 2025 https://help.aol.com/articles/dial-up-internet-to-be-discontinued ELI5-How is it that just 400 cables under the ocean provides all the internet to entire world? https://go.osu.edu/CcKd	
H 10/23	The Internet: IP	NEWTON: Internet, Internet address, Internet Protocol, IP, IP address, IP router, IP subnet, network address, Internet Assigned Numbers Authority TELECOM: 245 - 256 (Stop at TCP) http://computer.howstuffworks.com/internet-infrastructure.htm (First six pages) http://en.wikipedia.org/wiki/Internet_Protocol (stop before "Version history")	
T 10/28	The Internet: TCP, UDP	NEWTON: transport layer, TCP/IP, UDP TELECOM: 256 - 257 (TCP and UDP) http://en.wikipedia.org/wiki/Transmission_Control_Protocol (Introduction, Historical origin, Network function, and all four subsections of "Protocol operation|Data transfer") http://en.wikipedia.org/wiki/User_Datagram_Protocol (just introduction) http://compnetworking.about.com/od/networkprotocols/l/aa071200b.htm	Problem set 5 corrections & Problem set 6

Date	Topics	Readings	Assignment
H 10/30	The Internet: DNS, Firewalls	NEWTON: DNS, DNS name resolution, firewall, proxy server TELECOM: 280 (DNS) - 285 (stop at Evolution of the POP Architecture) https://computer.howstuffworks.com/internet/basics/internet-infrastructure6.htm (Pages 7-9) http://www.iana.org/gtld/gtld.htm http://www.whois.com/whois/osu.edu http://en.wikipedia.org/wiki/Firewall_(computing) (Introduction, History, Types|Packet filter, and Types|Appliction Layer)	
T 11/4	The Web: HTTP	NEWTON: HTTP, HTTP referrer, HTTPS http://en.wikipedia.org/wiki/Http (Introduction, Technical overview, and History [stop after the table listing the dates each version was introduced]) https://developer.mozilla.org/en-US/docs/Web/HTTP/Headers	Problem set 6 corrections & Problem set 7
H 11/6	Advanced Web: Cookies & Query parameters	NEWTON: URL, URL shortening service, cookie, cookie blocking, cookie file http://computer.howstuffworks.com/cookie.htm (all 6 pages) https://en.wikipedia.org/wiki/Query_string https://developers.google.com/maps/url-encoding	
T 11/11	Veteran's Day	No Class	
H 11/13	The Web: HTML, XML, CSS, JavaScript	NEWTON: HTML, HTML tag, HTML 5.0, XML, XML attributes, XML element, cascading style sheets https://www.w3schools.com/html/html_intro.asp (Only first page is required) https://medium.com/@cunderwoodmn/using-xml-to-create-web-pages-541d91593104 https://en.wikipedia.org/wiki/HTML5 (Introduction) http://computer.howstuffworks.com/javascript.htm *Optional:* https://www.w3schools.com/tags/tag_table.asp	

Date	Topics	Readings	Assignment
T 11/18	TLS & Email	NEWTON: Secure Socket Layer, Transport Layer Security, all entries beginning "email", IMAP, POP3, SMTP, phishing https://en.wikipedia.org/wiki/Transport_Layer_Security (Introduction and Description) http://www.howtogeek.com/56002/htg-explains-how-does-email-work/	**Watch the lecture video from 11/5 before class**
H 11/20	Telephony **NOTE:** No in-person lecture today; instead, watch a prerecorded lecture before our next class	NEWTON: telephony, PSTN, POTS, circuit, circuit switching, circuit switched network, LEC (defn 1), IXC, point of presence, signaling, Signaling System 7, Captain Crunch, voice over IP, SIP (defn 3), digital convergence TELECOM: 334 (start at SIP) - 339 (stop at ENUM) http://electronics.howstuffworks.com/telephone.htm (all 8 sections) http://en.wikipedia.org/wiki/Local_exchange_carrier (Introduction, Duties) http://electronics.howstuffworks.com/ip-telephony.htm (First 9 sections) http://en.wikipedia.org/wiki/Session_Initiation_Protocol (Introduction, History, Protocol operation) *Optional:* How photographs were sent by wire in the 1930s https://go.osu.edu/CcKa	
T 11/25	Mobile Telephony	NEWTON: cell phone, cell phone range, ESN (defn 2), frequency reuse, SIM card, SIM lock, GSM, MTSO, roaming TELECOM: 580-1 https://theconversation.com/whats-cellular-about-a-cellphone-150352 (watching the 2m video is optional) https://docs.fcc.gov/public/attachments/DOC-374726A1.pdf https://fcc.maps.arcgis.com/apps/webappviewer/index.html?id=6c1b2e73d9d749cdb7bc88a0d1bdd25b (click Okay and then select layers)	Problem set 7 corrections & Problem set 8
H 11/27	Thanksgiving	No Class	

Date	Topics	Readings	Assignment
T 12/2	Mobile Standards	NEWTON: 3G, 4G, 4G/LTE, 5G (sadly out of date considering it was published in '21) https://en.wikipedia.org/wiki/5G (Introduction, Overview, Performance, and Deployment | Spectrum) https://en.wikipedia.org/wiki/6G (Introduction, Expectations, & Geopolitics)	Problem set 8 corrections & Problem set 9
H 12/4	Privacy & Surveillance	NEWTON: Internet of Things, firmware over-the-air, robocall, vishing https://privacyrights.org/resources/somebodys-watching-me-employee-monitoring https://mashable.com/2016/08/11/webcam-texas-hack/#6EK0UDEGk5qc http://www.usnews.com/news/articles/2015/08/25/the-illusion-of-online-privacy *Optional:* See if your account information is on the dark web: https://haveibeenpwned.com/ Take Google's phishing quiz: https://phishingquiz.withgoogle.com/ Learn about Internet security from OSU https://cybersecurity4you.osu.edu/security/cybersecurity-for-you-c4u (authentication w/ OSU credentials required)	
T 12/9	Malware	NEWTON: malware, virus, worm (defn 2), trojan horse, trojan horse attack, ransomware, adware, black hats https://en.wikipedia.org/wiki/Malware (Reading the whole thing. It is worth it.) https://www.consumer.ftc.gov/articles/0011-malware	Problem set 9 correction
T 12/16 2:00pm-3:45pm	**Final exam *** Note the date and time *****		