**COMM 4557 Communication Network Infrastructure**
Autumn 2021 – Last updated 8/9/2021

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|---|---|
| Lecture: | Denney Hall 238<br>W/F 11:10am – 12:30pm |
| Instructor: | Dr. Kelly Garrett<br>3131 Derby Hall or 3016 Derby Hall<br>Email: garrett.258@osu.edu<br>***Please include the "Comm 4557" in the subject line*** |
| Office Hours: | via Zoom on Mondays 4-5pm + by appointment |
| Website: | https://carmen.osu.edu<br>(please access Zoom from Carmen) |

**Rationale and objectives**

How is sound transmitted over the telephone network? How does data flow across the Internet? What is the difference between a telephone call and a Skype call? How and why do Internet technology pose a threat to privacy? These are a few of the questions that you should be able to answer after completing this course. The focus of the class is on developing a basic understanding of telecommunication technologies, from radio broadcasting and the PSTN to streaming audio and encrypted Internet communication. We cover a variety of contemporary telecommunication systems, addressing both what they can do and how they work. We pay particular attention to the similarities and differences between digital and analog technologies.

***Specific Learning Objectives:***

With these skills, you will be better prepared to

- Explain technologies to those who are less knowledgeable
- Read tech news
- 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. (2018). *Newton's Telecom Dictionary* (31th 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.

**COVID-19 Policies:**

Please note that these policies may be updated to reflect changes in the epidemic, changes in our understanding of the disease, and changing University, local, state, and federal recommendations/mandates.

**Vaccination.** The COVID-19 vaccine is the single best way to protect yourself and others from the disease. Widespread vaccination also offers us our best chance of ending the pandemic and getting back to a pre-pandemic lifestyle. If you haven't already, please get vaccinated. It is safe, effective, and free.

**Masks and social distancing.** The university requires that everyone on campus wears masks indoors. Wearing a mask that covers your mouth and nose is important because it can help slow the spread of COVID-19. There are several reasons to do this, even if you are vaccinated. First, the "Delta variant," which is the dominant version of the virus that causes COVID in the U.S. today, is highly contagious, and has caused a huge increase in cases recently. Second, even if you are vaccinated, there have been some cases of "breakthrough" infection, where a vaccinated person becomes ill. These cases are much less severe than cases among unvaccinated individuals, but you still don't want to go through it if you don't have to. Finally, and most importantly, if you get COVID-19 you can spread it to other people, including young children and others who cannot take the vaccine. In short, masks help protect you and they help you protect other people.

Social distancing may also help slow the spread of COVID. Although classrooms are no longer configured to ensure that students can spread out, doing so may still be helpful if you have the opportunity.

**Policies and Expectations:**

**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 in class.

**Participation is required.** I hope to conduct this class in-person for the whole semester, but this is not assured. If necessary, I am prepared to deliver the course content online. Regardless of how class is conducted, you are still expected to be present (in-person or

virtually) and to actively participate at the same time as the rest of the class (barring health issues that prevent it).

If we have to move online, please note that it is also important that you turn on your webcam during class. Seeing one another helps build community. It also provides me with essential visual feedback about the class.

**Attendance.** 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.

That said, given the continued high prevalence of COVID, including breakthrough cases among vaccinated individuals, **students should not attend class if they are feeling sick**. It is very important that individuals avoid spreading the virus to others. Most students should be 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.**

**Recordings of class sessions.** I intend to post lecture slides and recordings of our class sessions on Carmen. These recordings are not a substitute for the in-person learning experience. Instead, they are a tool to help those who are forced to miss class on account of illness to catch up. As 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. All assignments must be turned in to Carmen by the start of class on the due date. Your answers should be submitted using Carmen's built-in text editor. I do, however, encourage you to prepare your answers in a word processor, and then copy-and-paste them into the text editor. This will make it easier for you to prepare your corrections, which I describe in more detail below. (See Course Requirements, below, for important details about the Problem Sets.)

**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 time 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 or exam. Please note that a challenge may result in grades being raised or lowered.

**Classroom Civility.** We want to build a classroom climate that is comfortable for everyone. In a communication class, it is especially important that we (1) display respect for all members of the classroom, including the instructor and students; (2) pay attention to and participate in all class sessions and activities; (3) avoid unnecessary disruption during class time (e.g., having private conversations, reading the newspaper, doing work for other classes, etc.); and (4) avoid racist, sexist, homophobic, or other negative language that may unnecessarily exclude members of our campus and classroom. This is not an exhaustive list of behaviors; rather, they represent the minimal standards that help make the classroom a productive learning environment for all concerned.

**Punctuality**. Class begins on time every day so that all scheduled discussions and activities can be completed. You are expected to be punctual.

**Academic integrity policy.** Each student in this course is expected to demonstrate academic integrity and to abide by the *Code of Student Conduct* (http://studentaffairs.osu.edu/resource_csc.asp and see http://oaa.osu.edu/coamtensuggestions.html). *Academic misconduct* includes, but is not limited to, (1) plagiarism (using others' work without citing/crediting them), (2) fabricating information or citations, (3) facilitating acts of dishonesty by others, (4) having unauthorized possession of past exam questions, (5) submitting work previously submitted to another course or work of another person, (6) tampering with the academic work of other students, and (7) cheating on quizzes/exams. Academic misconduct on any assignment will result minimally in receiving a zero on that assignment and may also lead to further disciplinary action. **Penalty for violation of the *Code of Student Conduct* can also be extended to include failure of the course and University disciplinary action.** It is your responsibility to be aware of the rules of academic dishonesty—ignorance is not a defense. ***When in doubt, talk to me.***

Please note that although collaboration is required throughout this course and cooperation is *strongly* encouraged, any work submitted by a student for academic credit must be the student's own work. You are encouraged to study with classmates and to discuss information and concepts covered in lecture 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, or a hard copy.

**Academic Misconduct.** 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 3335-5-487). For additional information, see the Code of Student Conduct http://studentlife.osu.edu/csc/

**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 above, active participation in the class is critical to your ability to learn this material. This means that it is incumbent on you to 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 is hard, but it will make a profound difference your ability to learn this material. Plus, it is a critical life skill. Trust me when I tell you that your friends, your family, your 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.**

Most, but not all, class work can be completed using a tablet. You will also find it helpful to have access to a word processor such as Google Docs, Microsoft Word or Apple Pages. If we have to move to an online format, you will also need a computer that has a webcam and microphone, and that has reliable Internet access (minimum of about 5Mbps [and by the time you've finished this class, you'll know why]).

**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://resourcecenter.odee.osu.edu/carmen.

*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).

*Proctorio:* I plan to administer class exams remotely using Proctorio, an online proctoring tool. You are required to have a webcam (USB or internal) with a microphone and a reliable Internet connection. Proctorio will 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 Proctorio 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.

*CarmenZoom (aka Zoom)*: Office hours will be conducted using Zoom. (If we move to an online lecture format, we will also use Zoom for our lectures.) Zoom can be accessed via the Google Chrome web browser or using the Zoom app.

To join the lecture, please do the following:

1. Sign into the class Carmen page
2. Select "Zoom" from the menu on the left side of the screen.
3. Click the "Join" button next to the day's class session
4. Follow the prompts

Please make sure you are familiar with the full range of Zoom features, including muting audio and video, using non-verbals (raise hand, yes/no, thumb up/down), and using the text chat. Much more information about Zoom is available here: https://resourcecenter.odee.osu.edu/carmenzoom.

**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 these 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, **any time before class** you must post a comment or question about the reading for the day. 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, some time **on the day after a class lecture** you must post at least one review question related to the material covered in that lecture. 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 six with no penalty.

**In-class exercises.** There will be a variety of in-class exercises. Like the problem sets, the goal of these is to help you improve your understanding of the class material. They will 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, each individual is expected to turn in their own attempt at documenting the solution. As mentioned elsewhere in this document, we will use a variety of different technologies to submit these materials, though Carmen will be commonly used.

As with posts, missed in-class exercises cannot be made up. You can, however, miss up to three 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. If there is a question that you do not know how to answer, please seek help from me or a classmate. You may 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**, and describe what is confusing you to the best of your ability.

(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, explain how your new answer fixes this problem, and indicate which class reading or slide provides the information you need to correct your answer. (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. **Please make any text that you add bold and red.**
- **Correct and explain all your errors**

Here's an (intentionally silly) example:

1. Cookie Monster is ~~green because of all the leafy green vegetables he eats~~. **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 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. (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 administered on Carmen with the aid of Proctorio. Please ensure that this service works on the computer that you will use to take the exam. I encourage you to test it 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 during testing.

## Grading

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|---|---|
| In-class exercises | 10% |
| Discussion board posts | 10% |
| Problem sets | 25% |
| Midterm | 25% |
| Final | 30% |

## Grading scale

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|---|---|
| 93–100: A | 73–76.9: C |
| 90–92.9: A- | 70 –72.9: C- |
| 87–89.9: B+ | 67 –69.9: D+ |
| 83–86.9: B | 60 –66.9: D |
| 80–82.9: B- | Below 60: E |
| 77–79.9: C+ | |

**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). 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 it offers a variety of support services, including a student emergency fund, and can connect students with other resources around campus.

**COVID-19 Accommodations**

The university strives to make all learning experiences as accessible as possible. In light of the current pandemic, students seeking to request COVID-related accommodations may do so through the university's request process, managed by Student Life Disability Services. If you anticipate or experience academic barriers based on your disability (including mental health, chronic, or temporary medical conditions), please let me know immediately so that we can privately discuss options. To establish reasonable accommodations, I may request that you register with Student Life Disability Services. After registration, make arrangements with me as soon as possible to discuss your accommodations so that they may be implemented in a timely fashion. **SLDS contact information:** slds@osu.edu; 614-292-3307; slds.osu.edu; 098 Baker Hall, 113 W. 12th Avenue.

**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 are or someone you know is 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 http://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.

If you are thinking of harming yourself or need a safe, non-judgmental place to talk, or if you are worried about someone else and need advice about what to do, 24 hour emergency help is also available through the Suicide Prevention Hotline (Columbus: 614-221-5445 / National: 800-273-8255); or text (4hope to 741741); or at suicidepreventionlifeline.org

## Accessibility accommodations for students with disabilities

**The university strives to make all learning experiences as accessible as possible. In light of the current pandemic, students seeking to request COVID-related accommodations may do so through the university's request process, managed by Student Life Disability Services. If you anticipate or experience academic barriers based on your disability (including mental health, chronic, or temporary medical conditions), please let me know immediately so that we can privately discuss options. To establish reasonable accommodations, I may request that you register with Student Life Disability Services. After registration, make arrangements with me as soon as possible to discuss your accommodations so that they may be implemented in a timely fashion. SLDS contact information: slds@osu.edu; 614-292-3307; slds.osu.edu; 098 Baker Hall, 113 W. 12th Avenue.**

**This online course requires use of CarmenCanvas (OSU's learning management system) and other online services. Information about the accessibility features supported by CarmenCanvas is available here: https://community.canvaslms.com/docs/DOC-2061. If you need additional services to use these technologies, please talk to me.**

**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.
REMINDER: 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 |
|---|---|---|---|
| W 8/25 | Syllabus & Overview | This syllabus | See REMINDER, above |
| F 8/27 | 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.)*<br><br>http://www.youtube.com/watch?v=-oGwFDQNJps<br>http://science.howstuffworks.com/humans-hear-in-space1.htm<br>http://en.wikipedia.org/wiki/Waveform<br>http://en.wikipedia.org/wiki/Frequency<br>http://en.wikipedia.org/wiki/Amplitude (stop at "Root mean square amplitude") | |
| W 9/1 | Signals | NEWTON: Fourier's theorem, filter (defn 1), signal level, signal decay<br><br>https://www.wired.com/2014/06/the-fourier-theorem-science-of-music-acoustics/<br>https://en.wikipedia.org/wiki/Audio_filter (skip Self-oscillation)<br>https://youtu.be/JndvN1ngSi4 | |
| F 9/3 | Modulation | NEWTON: modulation, demodulation, amplitude modulation, frequency modulation, bandwidth (defn #1), noise, signal-to-noise ratio, spectrum,<br><br>TELECOM: 11 (at Spectrum) – 18 (before Transmission)<br><br>http://en.wikipedia.org/wiki/Bandwidth_(signal_processing) (Introduction and overview)<br>http://en.wikipedia.org/wiki/Modulation (Just introduction, stop at Contents)<br>http://en.wikipedia.org/wiki/Amplitude_modulation (Sections: Intro and History; look at Fig. 1)<br>http://en.wikipedia.org/wiki/Frequency_modulation (Sections: Intro and Radio; look at animation)<br><br>*Optional:* https://www.cancer.gov/about-cancer/causes-prevention/risk/radiation/cell-phones-fact-sheet | |

| Date | Topics | Readings | Assignment |
|---|---|---|---|
| W<br>9/8 | Transmission Basics | NEWTON: frequency division multiplexing, radio, signal converter, frequency band, diffraction, spectrum congestion, spectrum designation of frequency, spectrum management, propagation delay<br><br>TELECOM: 1 - 11 (before Spectrum), 23 (first paragraph of multiplexing), 26 (just FDM)<br><br>http://en.wikipedia.org/wiki/Multiplexing (introduction and frequency-division multiplexing)<br>http://electronics.howstuffworks.com/radio-spectrum.htm (first three pages of entry)<br>https://en.wikipedia.org/wiki/Cellular_frequencies_in_the_US<br><br>*Optional:* https://youtu.be/r-shNhpBkhs | Problem set 1 |
| F<br>9/10 | Digital basics | NEWTON: analog, analog transmission, digital, digital signal, digital transmission, binary number system, binary, bit<br><br>TELECOM: 18 - 23 (including Table 1.1)<br><br>http://computer.howstuffworks.com/bytes.htm (first four pages of entry)<br>http://electronics.howstuffworks.com/analog-digital.htm (first five pages of entry)<br>http://games.penjee.com/binary-numbers-game/ | |
| W<br>9/15 | Digital Representation | NEWTON: ASCII, PCM, encoding, sampling, sampling frequency, sampling rate, quantization, Nyquist Theorem, codec, bit rate<br><br>TELCOM: 160-161 (Coding schemes: ASCII…)<br><br>https://www.tutorialspoint.com/digital_communication/digital_communication_pulse_code_modulation.htm<br>https://youtu.be/YJmUkNTBa8s?t=6s IMPORTANT: You can stop at 2m15s | Problem set 1 corrections & Problem set 2 |

| Date | Topics | Readings | Assignment |
|---|---|---|---|
| F 9/17 | Digital Representation, part 2 | NEWTON: pixel, bit depth, raster graphics, bitmap, vector images, aliasing ,aliasing noise<br><br>TELECOM: 390-396 (before Television Standards)<br><br>http://preservationtutorial.library.cornell.edu/intro/intro-01.html<br>(Link is to "1. Basic Terminology" section, 8 pages in all)<br>https://en.wikipedia.org/wiki/Raster_graphics<br>https://en.wikipedia.org/wiki/Vector_graphics<br>http://www.wfu.edu/~matthews/misc/DigPhotog/alias/<br><br>*Optional*: https://www.youtube.com/watch?v=1LZWCSKj45g | |
| W 9/22 | Compression & Brief intro to Cryptography | NEWTON: compression, compression algorithm, compression artifacts, encryption, encryption key, cipher, non-repudiation<br><br>TELECOM: 375 (at Encryption) - 381<br><br>http://computer.howstuffworks.com/file-compression.htm<br>http://computer.howstuffworks.com/encryption.htm<br>(first four pages of entry) | Problem set 2 corrections & Problem set 3 |
| F 9/24 | Cryptography | NEWTON: public key encryption, challenge-response, RSA (defn 2)<br><br>http://youtu.be/EPXilYOa71c<br><br>*Recommended, but optional:*<br>For other cryptography videos from the Khan Academy, see: https://www.khanacademy.org/math/applied-math/cryptography<br><br>*Optional:* If you want to know more about the math<br>http://youtu.be/IY8BXNFgnyI<br>http://youtu.be/cJvoi0LuutQ | |
| W 9/29 | Digital data transmission | NEWTON: Parity, parity bit, Time Division Multiplexing, network, LAN, host, hub, router, Ethernet, WiFi, WiFi access point<br><br>TELECOM: 26-27 (TDM), 164, 173-177 (stop at LAN Transport Techniques), 182-184 (stop at Shared Versus Switched), 215 - 219 (Packet-Switched Networks)<br><br>http://en.wikipedia.org/wiki/Multiplexing<br>(time-division multiplexing only) | Problem set 3 corrections & Problem set 4 |

| Date | Topics | Readings | Assignment |
|---|---|---|---|
| F 10/1 | Digital network performance | NEWTON: propagation delay, latency, cache (def. 2), streaming, streaming media | |
| W 10/6 | Connecting to the Internet | NEWTON: broadband, cable modem, fiber, fiber to the curb, fiber to the most economical point, FTTP<br><br>TELECOM: 388 - 390 (stop at Digital Video), 529<br><br>http://computer.howstuffworks.com/cable-modem.htm (All)<br>http://computer.howstuffworks.com/fiber-to-the-home.htm (Pages 1-2, 4) | Problem set 4 corrections & Problem set 5 |
| F 10/8 | Review & exam prep | Wrap up unfinished topics<br>Review for midterm | |
| **W 10/13** | | **Midterm** | |
| F 10/15 | Autumn Break | No Class | |
| W 10/20 | Internet Protocol stack | NEWTON: protocol, protocol stack, OSI reference model, OSI standards<br><br>TELECOM: 165 (OSI Reference Model) - 171, 264 - 269 (before Addressing Schemes) | |
| F 10/22 | The Internet: IP | TELECOM: 245 - 256 (Stop at TCP)<br><br>http://computer.howstuffworks.com/internet-infrastructure.htm (All)<br>http://en.wikipedia.org/wiki/Internet_Protocol (stop before "Version history")<br><br>*Recommended*: Newton - Internet, protocol, IP (def. 1), Internet address | Problem set 5 corrections & Problem set 6 |
| W 10/27 | The Internet: TCP, UDP | TELECOM: 256 - 257 (TCP and UDP)<br><br>http://en.wikipedia.org/wiki/Transmission_Control_Protocol (introduction, historical origin, network function, and all subsections of data transfer)<br>http://en.wikipedia.org/wiki/User_Datagram_Protocol (just introduction)<br>http://compnetworking.about.com/od/networkprotocols/l/aa071200b.htm<br><br>*Recommended*: Newton - TCP/IP, TCP (def. 1), UDP, firewall | |

| Date | Topics | Readings | Assignment |
|---|---|---|---|
| F 10/29 | The Internet: DNS, Firewalls | NEWTON: DNS , firewall, proxy server<br><br>TELECOM: 280 (DNS) - 285 (stop at Evolution of the POP Architecture)<br><br>http://www.iana.org/gtld/gtld.htm<br>http://www.whois.com/whois/osu.edu<br>http://en.wikipedia.org/wiki/Firewall_(computing) (Introduction, Types: network layer & Application layer) | Problem set 6 corrections |
| W 11/3 | The Web: HTTP, HTML, and more (if there's time) | NEWTON: HTTP, HTTP referer, HTML, HTML tag, HTML 5.0, XML, XML attributes, XML element, cascading style sheets<br><br>http://en.wikipedia.org/wiki/Http (Introduction, technical overview, and example session)<br>http://www.perlfect.com/articles/http.shtml<br>http://computer.howstuffworks.com/javascript.htm | |
| F 11/5 | Advanced Web: Cookies & Query parameters | NEWTON: URL, URL shortening service, cookie, cookie file<br><br>http://computer.howstuffworks.com/cookie.htm (all pages)<br>https://en.wikipedia.org/wiki/Query_string | Problem set 7 |
| W 11/10 | TLS & Email | NEWTON: SSL, TLS (defn 2), HTTPS, all entries beginning "email", IMAP, POP3, spoofing (first paragraph), phishing<br><br>https://en.wikipedia.org/wiki/Transport_Layer_Security (introduction and description)<br>http://www.howtogeek.com/56002/htg-explains-how-does-email-work/ | |
| F 11/12 | Telephony: | NEWTON: telephony, PSTN, POTS, circuit, circuit switching, circuit switched network, LEC (defn 1), IXC, point of presence, signaling (not "Signaling System 7"), Captain Crunch, voice over IP, SIP (defn 3)<br><br>TELECOM: 334 (start at SIP) - 339 (stop at ENUM)<br><br>http://electronics.howstuffworks.com/telephone.htm (including video)<br>http://en.wikipedia.org/wiki/Local_exchange_carrier<br>http://electronics.howstuffworks.com/ip-telephony.htm<br>http://en.wikipedia.org/wiki/Session_Initiation_Protocol (Introduction, history, protocol operation) | |

| Date | Topics | Readings | Assignment |
|---|---|---|---|
| W 11/17 | Mobile Telephony | NEWTON: cell phone, cellphone range, ESN (defn 2), SIM card, GSM, MTSO, roaming<br><br>TELECOM: 580-1<br>https://docs.fcc.gov/public/attachments/DOC-374726A1.pdf<br>https://fcc.maps.arcgis.com/apps/webappviewer/index.html?id=6c1b2e73d9d749cdb7bc88a0d1bdd25b | Problem set 7 corrections & Problem set 8 |
| F 11/19 | Mobile Standards | NEWTON: 3G, 4G, 5G<br><br>https://en.wikipedia.org/wiki/5G<br>https://www.tomsguide.com/us/5g-networking-faq,news-20629.html | |
| W 11/24 | Thanksgiving | No Class | |
| F 11/26 | Thanksgiving | No Class | |
| W 12/1 | Privacy & Surveillance | https://privacyrights.org/resources/somebodys-watching-me-employee-monitoring<br>https://mashable.com/2016/08/11/webcam-texas-hack/#6EK0UDEGk5qc<br>http://www.usnews.com/news/articles/2015/08/25/the-illusion-of-online-privacy | Problem set 8 corrections & Problem set 9 |
| F 12/3 | Malware | NEWTON: malware, virus, worm (defn 2), Trojan horse, ransomware, adware, black hats<br><br>https://en.wikipedia.org/wiki/Malware<br>https://www.consumer.ftc.gov/articles/0011-malware | |
| W 12/8 | | Wrap up, case study, and review for final | Problem set 9 correction |
| **Th 12/16 12:00pm-1:45pm** | | **Final exam *** Note the date and time *** ** | |