# COMM 4557: Communication Networks

The Ohio State University
School of Communication

**Instructor:**
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Please see on Carmen/News

## Course Rational 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? Between a television broadcast and a YouTube video? 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 PSTN to streaming audio and HDTV. We will cover a variety of contemporary telecommunication systems, addressing both what they can do and how they work. We will pay particular attention to the similarities and differences between digital and analog technologies. For a better understanding of communication technologies we will also go into technological details such as wave propagation, data compression, cryptography and several others.

With these skills, you will be better prepared to

- Read tech news
- Explain technologies to those who are less knowledgeable
- Think critically about key capabilities and limitations of existing and novel telecommunication systems
- Follow and participate in technology discussions with engineers and other experts when working together in development projects.

*What do I need to do for class?*
Be there, take your notes, ask questions if you are not sure about a topic, and feel free to comment on things based on your own experiences and ideas. The more you are willing to contribute to class discussions, the better the chance to make it a really good learning experience for all of us. All ICAs and assignments are based on your class participation as well as the necessary understanding of class topics. Thus, regular attendance is the key to complete this class successfully.

**Class is:** Tuesday and Thursday
9:35 to 10:55 a.m.
Room: Denny Hall 214

**Used Text (required):**
Goleniewski, Lillian. (2007). *Telecommunications Essentials* (2nd ed.). Upper Saddle River: Addison Wesley.

If not otherwise stated, all the page numbers in the class schedule (at the end of this syllabus) relate to the required text book.

This book is available at several campus bookstores and through Amazon. It is also available through the library as an ebook, but the page numbers do not match the syllabus. This makes it very difficult to use for this class.

I also recommend using optional dictionaries for this class, e.g. the one listed here:
Newton, Harry. (2014). *Newton's Telecom Dictionary* (28th ed.). New York: Flatiron Publishing.

We will also make use of some popular web sites (e.g. HowStuffWorks and Wikipedia). Links to the relevant entries are included in this syllabus. Unless otherwise noted, you should read all sections of the articles/entries listed. I also encourage you to pursue links within the required entries 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 sources and consider them to be quite reliable in regard to the specific topics, the content can change and the entries may sometimes contain errors. Cross checking the information you find here with the dictionary and lecture is strongly encouraged (TechWeb's encyclopedia is also a useful resource).

**Class Web site via Carmen:**

http://telr.osu.edu/carmen

*Please be sure to check Carmen at least twice a week for news, changes,…*

## Special Accommodations

Students with disabilities are responsible for making their needs known to the instructor and seeking assistance in a timely manner. Any student who feels he/she may need an accommodation based on the impact of a disability should contact the instructor privately to discuss your specific needs. Please contact the Office for Disability Services at 614-292-3307 in Room 150 Pomerene Hall to coordinate reasonable accommodations for students with documented disabilities.

### Academic Integrity and Academic Misconduct

It is imperative that all work you submit be your own. When you use someone else's ideas, you must give proper credit to the original author(s). Please adhere to the 5th edition of the APA manual of style when citing others' work.

According to the Committee on Academic Misconduct "Academic misconduct is defined as any activity which tends to compromise the academic integrity of the institution, or subvert the educational process," (http://oaa.osu.edu/procedures/1.0.html). Further, the term "academic misconduct" includes all forms of student academic misconduct wherever committed and is 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). It is the responsibility of the Committee of Academic Misconduct to investigate or establish procedures for the investigation of all reported cases of

student academic misconduct. For additional information, see the Code of Student Conduct (http://studentaffairs.osu.edu/resource_csc.asp).

**Exams**

The information taught before an exam will be tested on this exam. It will be not tested on the following exam again (exams in this class are not cumulative).

Exams will be multiple-choice (please bring a #2 pencil on exam days), based on the material from the readings and class discussions. Make-up exams will only be offered for medical or other similar, legitimate reasons.

Failure to take any exam will result in a zero for the exam.

Late Arrival: I reserve the right to exclude students from the exam if they arrive late. Exclusion will result in a zero for the exam.

**In-Class Assignments (ICA)**

During most classes we will have (unannounced) In-Class Assignments (10 over the whole semester) where you should take a few minutes to write on an assigned topic. ICAs have to be completed during class. They should help you to reflect specific topics of the lecture.

One of them provides the opportunity of bonus points. Only 9 of the 10 ICAs are necessary to obtain the chance to score 100% in this class.
*(Example: You have completed all 10 ICAs successfully = 18 regular points + 2 bonus points; you have completed 9 ICAs successfully = 18 regular points and 0 bonus points.)*

**Online Assignments**

On 6 days the class will move online. Students are asked to complete online assignments which are based on class discussions, handout, students' notes, and additional scholarly work. The online assignments have to be completed on those assigned days to receive credit. We will not meet on those days but the Professor (or TA) is available to discuss the assignment and to answer questions. The overall goal is to increase learning flexibility and effectiveness and to adapt the course to the changing environment of higher education.

**Team Assignment – Final Paper**

There will be a team assignment that needs to be completed together with other students. Every team member will get the same score.
Detailed instructions and deadlines will be announced in class. Late submissions will be penalized.

**Evaluation**

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| In-Class Assignments | 18% (18 points – 9*2) |
| Online Assignments | 18% (18 points – 6*3) |
| Team Assignment (Final Paper) | 10% (10 points) |
| Exams (weighted equally) | 54% (54 points – 2*27) |
| *Total* | *100% (100 points)* |

**Grade Change Requests**

Students are strongly encouraged to check posted points for all assignments and exams regularly on Carmen. The deadline for requesting any score changes (in case of score posting errors) for assignments or exams taken during the semester is the first day of the last week of regular classes, Monday, 04/25/2016. However, any missing points have to be reported 14 days after posting of the score in question. Later requests will not be considered.

**Makeup of missed Assignments**

Taking missed assignments late will only be allowed for serious, legitimate reasons (documentation needed like doctor's note). Students are required to inform the instructor before the originally scheduled assignment/exam time. Otherwise, a makeup opportunity cannot be granted.

## Class Schedule and Reading List

| Day | Date | Topic | Reading |
|---|---|---|---|
| T | 1/12/2016 | Introduction & Overview | |
| R | 1/14 | Waves and Signals | Telekom Introduction + p. 550 (start at history) – 557 (stop before phased array)<br>http://science.howstuffworks.com/humans-hear-in-space1.htm<br>http://www.youtube.com/watch?v=-oGwFDQNJps<br>http://en.wikipedia.org/wiki/Waveform<br>http://en.wikipedia.org/wiki/Frequency<br>(stop before examples)<br>http://en.wikipedia.org/wiki/Modulation<br>(stop before "digital modulation methods") |
| T | 1/19 | Waves and Signals (cont.) | |
| R | 1/21 | Modulation and Spectrum | p. 11 (start at Spectrum) -18, 23 – 26 (stop before TDM)<br>http://en.wikipedia.org/wiki/Amplitude_modulation<br>(just introduction and figure 1)<br>http://en.wikipedia.org/wiki/Frequency_modulation<br>(Introduction, "radio", and associated figures)<br>http://en.wikipedia.org/wiki/Bandwidth_(signal_processing) (just introduction)<br>http://en.wikipedia.org/wiki/Multiplexing<br>(introduction and frequency-division multiplexing) |
| T | 1/26 | Transmission Basics | p. 1-11 (stop before Spectrum)<br>http://electronics.howstuffworks.com/radio-spectrum.htm<br>(first three pages of entry) |
| R | 1/28 | Online Assignment 1 | |
| T | 2/2 | Digital Basics | p. 20-23 (esp. table 1.1), 160-162 (coding schemes)<br>http://computer.howstuffworks.com/bytes.htm<br>(first four pages of entry)<br>http://electronics.howstuffworks.com/analog-digital.htm<br>(first four pages of entry) |
| R | 2/4 | Digital Representation | http://www.library.cornell.edu/preservation/tutorial/intro/intro-01.html<br>(Just "Basic Terminology" section, 8 pages in all<br>http://www.wfu.edu/~matthews/misc/DigPhotog/alias/ |

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|---|---|---|---|
| T | 2/9 | Compression & Cryptography | p. 375 (start with encryption) - 381, 390-396<br>http://computer.howstuffworks.com/file-compression.htm<br>http://computer.howstuffworks.com/encryption.htm (first four pages of entry) |
| R | 2/11 | Online Assignment 2 | |
| T | 2/16 | Digital Data Transmission | 26-27 (TDM), 83-87, 92-94 (packet switching), 173-187 (stop before LAN interconnection), 215-219<br>http://en.wikipedia.org/wiki/Circuit_switching (introduction)<br>http://en.wikipedia.org/wiki/Multiplexing (time-division multiplexing)<br>http://en.wikipedia.org/wiki/Packet_switching (Stop at X.25 vs. Frame Relay packet switching) |
| R | 2/18 | Digital Network Performance | p. 154-156, 159-160, 661-664, 388-390 (stop before digital video), 621-622 and Table 15.3<br>http://computer.howstuffworks.com/cable-modem.htm (All)<br>http://electronics.howstuffworks.com/dsl.htm (All)<br>http://computer.howstuffworks.com/wimax.htm<br>http://en.wikipedia.org/wiki/Bitrate (first section only) |
| T | 2/23 | Online Assignment 3 | |
| **R** | **2/25** | **Exam I** | |
| T | 3/1 | The Internet: Protocol Stack, IP | p. 165-171, 245-256 (stop before TCP)<br>http://computer.howstuffworks.com/internet-infrastructure.htm<br>http://computer.howstuffworks.com/osi.htm<br>http://en.wikipedia.org/wiki/Internet_Protocol |
| R | 3/3 | The Internet: TCP, UDP, Firewall | p. 256-257 (TCP and UDP), 264-275 (stop before IPv6)<br>http://en.wikipedia.org/wiki/Transmission_Control_Protocol (introduction, "historical origin", "network function", and "data transfer")<br>http://en.wikipedia.org/wiki/User_Datagram_Protocol (just introduction)<br>http://compnetworking.about.com/od/networkprotocols/l/aa071200b.htm |
| T | 3/8 | The Internet: DNS, HTTP | p. 280 (DNS) - 289 (stop before Internet challenges)<br>http://en.wikipedia.org/wiki/Http<br>http://www.iana.org/gtld/gtld.htm |
| R | 3/10 | Online Assignment 4 | |

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|---|---|---|---|
| T | 3/15 | ***Spring Break***<br>***No Class*** | |
| R | 3/17 | ***Spring Break***<br>***No Class*** | |
| T | 3/22 | Advanced Internet Topics: Cookies, SSL, Email, Web Programming | http://computer.howstuffworks.com/cookie.htm (all pages)<br>http://computer.howstuffworks.com/encryption4.htm (this is the fifth page of the encryption entry)<br>http://computer.howstuffworks.com/question369.htm<br>http://communication.howstuffworks.com/email.htm |
| R | 3/24 | Team Assignment<br>*Final Paper* | |
| T | 3/29 | Telephony: PSTN & Voice Over IP | p. 103-113, 129 – 135<br>http://electronics.howstuffworks.com/telephone.htm<br>http://en.wikipedia.org/wiki/Local_exchange_carrier<br>p. 140-142, 306 (SIP telephony), 334 (start at SIP) - 342 (stop before IPTV)<br>http://electronics.howstuffworks.com/ip-telephony.htm |
| R | 3/31 | Online Assignment 5 | |
| T | 4/5 | Mobile Telephony | p. 529, 579-614<br>http://reviews.cnet.com/4520-11288_7-5664933-1.html (Just the page on cell phone service providers)<br>http://en.wikipedia.org/wiki/WiMAX (Stop before "Technical information") |
| R | 4/7 | Online Assignment 6 | |
| T | 4/12 | Audio and Video Broadcasting | http://electronics.howstuffworks.com/radio8.htm (this page only -- this is review)<br>http://electronics.howstuffworks.com/question323.htm<br>http://electronics.howstuffworks.com/hd-radio.htm<br>http://electronics.howstuffworks.com/satellite-radio.htm http://www.howstuffworks.com/internet-radio.htm<br>http://www.howstuffworks.com/dtv.htm<br>http://electronics.howstuffworks.com/cable-tv.htm<br>http://www.howstuffworks.com/satellite-tv.htm<br>http://en.wikipedia.org/wiki/IPTV (Stop before "markets", but you can skim "History") |
| R | 4/14 | Audio and Video Broadcasting (cont.) | |

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|---|---|---|---|
| **T** | **4/19** | **Exam II** | |
| R | 4/21 | Pre-Review Final Paper | |
| **W** | **4/27 (11:59 p.m.)** | **Deadline Final Paper** | |

**Caveat**

I reserve the right to update or change portions of this syllabus in order to make the class a better experience for everyone. Any changes will be posted to Carmen.