



Why do we need to learn digital communications?

Have you ever asked yourself ...

- how is your voice transmitted from your cell phone, and received and played by another?
- why don't calls, texts and other apps interfere with one another?
- how does a cellular system keep track of different users?
- how much data can we pump through a coax cable or a fiber-optic line?
- how a file is zipped, and how much we can compress a file?
- why are small scratches on a CD tolerated? Have you wondered how error correction works?
- what does turbo coding do?
- how do broadband communications work?
- How does a modem work?

In this course we answer the above questions rigorously by learning the fundamentals of modern digital communications.

Recommended preparation:
Probability & stochastic processes, e.g., EECE6020
Communication systems, e.g., EECE5560

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WHAT YOU WILL LEARN IN THIS COURSE

- ✓ Building blocks of a digital communication system: knowing the big picture
- ✓ Digital formatting of information, sampling, modulation and demodulation techniques, and synchronization.
- ✓ Bandwidth and its connection to data-rate and modulation.
- ✓ Digital receivers, performance, and error probability: interplay among bandwidth usage, power, and quality of communication.
- ✓ Coding for compression, the source coding theorem.
- ✓ Channels and their properties, mutual information and Shannon's ingenious concept of channel capacity.
- ✓ Error correction: block and convolutional coding, turbo codes, and Shannon's channel coding theorem.
- ✓ Multichannel systems.
- ✓ Multiple access techniques: e.g., CDMA and GSM/TDMA, which are (used in G4/G5 cellular networks).