

# ECE 456: Computer Networks

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## Binary Information Representation

- Represent text, audio, video and other information in binary

## Frequency Spectrum

- Convert between time and frequency domain representations of signals
- Analyze spectral components of signals
- Time and frequency domain representation of linear systems

## Probability

- Understand concepts in probability, distributions such as uniform and exponential distributions
- Compute moment generating functions
- Calculate probability of events

## Computer Programming

- Write programs in computer language such as C, C++, Java, Perl or Python

## Pre-requisites

- ECE 251 with a C or higher; ECE 303/STAT 303 with a C or higher; ECE 311 with a C or higher; CS 163/CS 164 with a C or higher or CS 155; CS 156; CS157 with a C or higher

## Concepts:

- Circuit switching and packet switching
- Layered Architecture – ISO-OSI, TCP/IP
- Physical layer – Link Technologies, Encoding, Modulation
- Data link layer
  - Logical link control
  - Framing
  - Error detection and correction
  - Cyclic Redundancy Codes
  - Automatic Repeat Request (ARQ)
- Medium Access Control (MAC)
  - Local-Area Networks, IEEE 802.X Standards
- Internet Protocol (IP)
  - Addressing, Service Model
  - Routing
- Transport Protocols
  - TCP and UDP
  - Flow control, Congestion Control
- Network Programming
  - Socket system calls
  - Client-Server Paradigm
  - Concurrent and Iterative Servers
- Introduction to the Internet of Things
- Future trends in networking and computing

## Applications:

- Remote command execution
- File transfer
- Ethernet, WiFi, FTP

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## Distributed Systems

- Know network programming techniques to implement distributed systems

## Internet Protocols

- Understand fundamentals of Internet and basic Internet protocols (TCP/IP stack)

## Network Technologies

- Know examples of different networking technologies, and how they integrate to provide end-to-end connectivity and services

## Link Techniques

- Understands the different link technologies, encoding techniques, and error correction and recovery techniques
- Understand the techniques for sharing channel(s) by distributed network nodes