ECE 456: Computer Networks

IN

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 (uniform, Gaussian, exponential)
- Compute moment generating functions
- Calculate probability of events

Computer Programming

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

Pre-requisites

- ECE 251 with minimum grade of C; ECE 303/STAT 303 with minimum grade of C; ECE 311 with minimum grade of C; CS 163/CS 164 with minimum grade of C or CS152 with minimum grade of C

Concepts:

- Circuit switching and packet switching
- Layered Architecture – TCP/IP, ISO-OSI
- 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 Cellular Networks (2G-6G)
- 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
- Internet of Things
- Future of Networks and Network-based Systems

Applications:

- Client-server implementations
- Internet of Things
- Ethernet, WiFi, FTP

OUT

Communication Systems

- Understand the characteristics and limitations of communication channels, their capacity and techniques for achieving fast, reliable communication

Distributed Systems

- Utilize network programming techniques to implement distributed systems

Internet Protocols

- Understand fundamentals of Internet and 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 Technologies

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

Revised 2/2024