Listed below are the course outcomes. These outcomes will be assessed by assigning homework, a midterm, and a final.

1. Digital Transmission Fundamentals
   1.1. Understand the difference between transmission and propagation delay.
   1.2. Use Fourier series to model the frequency components of a periodic signal.
   1.3. Calculate the Nyquist sampling rate and Nyquist signaling rate
   1.4. Calculate the Shannon channel capacity
   1.5. Understand sampling, quantizing, quantization error, and quantizer SNR and be able to calculate any parameters related to sampling.
   1.6. Understand pulse code modulation (PCM).
   1.7. Understand modems, ASK, FSK, PSK, QAM, and constellations
   1.8. Understand the characteristics of different line codes.
   1.9. Perform error detection using parity, checksums, and cyclic redundancy check (CRC).
   1.10. Understand fiber optics and wavelength division multiplexing (WDM).

2. Circuit Switching
   2.1. Understand multiplexing, FDM, TDM, and WDM.
   2.2. Know the line rates of common lines such as DS1, DS3, E1, E3.
   2.3. Understand SONET, STS, OC, and how line rates are defined
   2.4. Describe UPSR and BLSR.
   2.5. Understand circuit switches like the CLOS switch.
   2.6. Describe components of the telephone network such as LATA, LEC, IXC, local loop, echo, hybrid, and digital cross-connect (DCC).
   2.7. Describe ISDN, BRI, and PRI.
   2.8. Describe SS7, SSP, STP, and SCP.
   2.9. Calculate blocking probability with Erlang-B.
   2.10. Describe the cellular phone system such as forward and reverse channels, cells, MTSO, and BSS.

3. Packet Switching
   3.1. Know the difference between congestion control and flow control.
   3.2. Understand automatic repeat request (ARQ) protocols to perform reliable communication over an unreliable network.
   3.3. Calculate the efficiency of the stop-and-wait protocol.
   3.4. Understand go-back-N to increase the efficiency.
   3.5. Understand framing issues in packet switching networks such as bit, character, and byte stuffing.
3.6. Understand the point-to-point protocol (PPP) and the use of the multilink PPP (MPPP).
3.7. Understand the terminology for classifying queues.
3.8. Use Little’s formula to calculate performance metrics.
3.9. Use M/M/1 to perform delay analysis of a packet switching network.

4. Medium Access Control Protocols and LANs
4.1. Describe MAC protocols and collisions
4.2. Understand slotted aloha, aloha, CSMA, and CSMA/CD
4.3. Be able to calculate the maximum efficiency of a protocol such as CSMA/CD
4.4. Describe Ethernet, 10BaseT, 100BaseT, Gigabit Ethernet, and 10 Gbps Ethernet
4.5. Describe the difference between a hub, bridge, switch, and router
4.6. Describe a VLAN