**EEL 4781 — Computer Networks**

**Curriculum Designation:** Technical for EE majors. Selective elective for CpE majors.

**Course (Catalog) Description:** This is a first course in the fundamentals of computer network design and analysis. The course will present network architecture using a layered approach. Analysis and examples of network protocols and standards will be presented. Techniques for evaluating network performance and selecting appropriate network protocols will be covered.

**Prerequisite:** EEL-4746

**Text and/or other recommended material:** Tanenbaum, *Computer Networks, 5th Edition, 2011*, Prentice-Hall.

**Course Objectives:**

1. Describe the architectures of the typical network implementations by using the OSI and TCP/IP Layered models, such as the Internet, LAN, MAN, and WAN. List the services provided by these networks.
2. Use delay models to analyze typical packet switching procedures step by step. List the differences between packet switching procedures and circuit switching procedures.
3. Tabulate the steps in error recovery methods including ARQ, Go-Back-N and Selective Repeat. List the advantages and disadvantages of the two error recovery approaches.
4. Describe the functionalities of data link layer protocols, CSMA/CD, the MAC protocols used in Ethernet, and wireless LAN (IEEE 802.11).
5. Describe the functionalities of network layer protocols such as IP, ICMP. Explain IP addressing and IPv6. Tabulate distance vector and Dijkstra algorithms step by step.
6. Choose appropriate protocol stacks for specific applications and services, such as the application layer protocols, HTTP, SMTP, and DNS, and transport layer protocols, TCP, UDP, and network layer protocols IPv4, IPv6.
7. Understand QoS issues and basic solutions, including IntegServ and DiffServ. List the advantages and disadvantages of the two solutions.
8. List the major flow control and congestion control methods. List the flow control and congestion control methods used in the Internet. List the options for flow control used in TCP major implementations.
9. Conduct basic network simulations by using OPNET and NS-2, which are the most important tools in networking area. One example is to simulate AODV or DSR by using NS-2 and reproduce the basic routing results.
Topics covered:

1. Overview of Telecom Networks
4. Network Elements: Major Switch and Router Implementations
6. IP Backbone Networks
7. 2G, 3G, 4G, and 5G Wireless Communication Networks
8. Wireless LANs
9. Mobile and Ad Hoc Networks
10. Switched Ethernet
12. QoS: IntServ and DiffServ.
14. Network Management Systems: Standard Models, and enterprise implementations such as HPOV, Cisco IOS, etc.

Class Schedule: Three 50 minute or two 75 minute lectures per week (3 credit hours).

Subject Area: Engineering

Significant Design: No

Relationship to Assessed ABET Student Outcomes: None

Last Updated by: R.J. Perry       Date: 4/30/2021