EEE 459 Communication Networks (3) [S]

Course (Catalog) Description:

Prerequisite:
EEE 203

Prerequisite or Co-requisite:
EEE 350.

Textbook:

Supplemental Materials:

Coordinator:
Martin Reisslein, Associate Professor

Prerequisites by Topic:
Basic knowledge of electrical circuits and systems. Elementary probability and random variables

Course Objective:
Students will be able to identify and relate the fundamental components of a communication network

Course Outcomes:
1. Students are conversant with the requirements and the protocols employed in the fundamental components in a communication network.
2. Students can analyze the impact of functional parameters in protocol design.

Course Topics:
1. Overview of Computer Networks and the Internet. 
   ISPs and Internet Backbones
   Delay and Loss in Packet Switched Networks
   Protocol Layers and Their Service Models
   Networks under Attack
2. Application Layer Protocols
   Basic Principles
   The Web and HTTP
   FTP
   SMTP
   DNS
   Overview of Socket Programming
   Content Distribution and Peer-to-Peer Networking
3. Overview of Transport Layer Services
   Multiplexing and Demultiplexing
   Connectionless Transport: UDP
   Principles of Reliable Data Transfer
Connection-Oriented Transport: TCP
Principles of Congestion Control
TCP Congestion Control
4. Overview of Network Layer and Routing
Routing Principles
Hierarchical Routing
IP
Routing in the Internet
Router Architecture
5. Overview of Link Layer
Overview of Error Detection and Correction
MAC
LAN Addresses, ARP
Ethernet
Hubs, Switches
6. Wireless and Mobile Networks
Wireless Links and Network Characteristics
WiFi: 802.11 Wireless LANs

Computer Usage: None.
Laboratory Experiments: None.

Course Contribution to Engineering Science and Design:
This course teaches engineering science and design by providing students with a basic understanding of the building blocks and mechanisms that make the Internet work. Students gain the opportunity to design small components of the networking protocol stack, such as a reliable packet transfer protocol and evaluate its performance through mathematical analysis. This course affords students also the opportunity to practice the modeling of networking mechanisms. For example, students need to make sensible approximations and simplifications to obtain performance results for otherwise mathematically intractable networking configurations and protocols. Students have also the opportunity to design local area networks, for instance the layout of a campus network. This design problem involves choosing the appropriate networking technology subject to user requirements and cost constraints.

Course Relationship to Program Outcomes:
a,e: Engineering and math background and problem solving abilities. Students can define a networking problem with appropriate consideration of context and constraints, and can recognize appropriate solutions. Students can develop models appropriate to a given networking problem using assumptions, estimates, and approximations guided by good engineering judgement.
c: Analysis of properties of communication systems
k: Our graduates are capable of using contemporary methods and tools for the design and evaluation of communication networks.

People preparing this description and date of preparation: Martin Reisslein, April 2008.