TLEN5430
Data Communications 2

Course Description
The course provides a detailed technical study of Internet and Internet-related protocols following a top-down approach through the protocol stack. Throughout, there is an emphasis on broader networking concepts and theory. These concepts are illustrated via current internet practice by a bit-level analysis of a large number of Internet and Internet-related protocols. The topics covered also include real-time and near real-time data streaming, IP mobility, IPv6, and an introduction to Internet security.

Outline
The class follows the Kurose and Ross class textbook with additional topics added via in-class lecture. For reference, a detailed table of contents for the text can be found by following the links on the Addison Wesley web site at wps.aw.com/aw_kurose_network_5/. The following is a summary of the topics covered in this class:

Network Fundamentals, Principles and Architectures
- Evolution of networks and history
- Key drivers and axioms
- Layered protocols and service models
- Core verses edge networks and components
- Introduction to wireless and mobility
- Examples of network architectures

Application Layer
- Defining principles for Application Protocols
- The Web and HTTP
- Directory Services and DNS systems and architectures
- E-mail, SMTP, MIME and Access Protocols
- FTP
- Basic application requirements for non-real-time and real-time
- Evolving wireless applications
- Content distribution: caching and Peer-to-Peer
- An introduction to network management and SNMP

Transport Layer
- Defining principles and services of Transport Protocols
- UDP and TCP
- Congestion management and control
- Evolution of TCP’s congestion window (Reno & Tahoe)
- ATM congestion control

Network Layer
- Defining principles and services for Network Layer Protocols
- IPv4 Addressing and DNS
Routing principles and processes
IGPs and EGPs
NATs
Router design and hardware
IPv6
Multicasting
IP mobility and mobile IP

Link and Physical Layers
Introduction to Coding Theory
Error detection and correction codes
MPLS

Wireless & Mobile Networks
Coding Principles and Introduction to Orthogonal codes and PN sequences
DS- and MC-CDMA
Wireless basics
IEEE 802.11 WiFi and other WLANs such as 802.15 & 16

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RTP and RTSP
Compression
Streaming
VoIP with H.323 and SIP
Integrated services including QoS, scheduling and services
RSVP
Differential services
Label switching

Security
Introduction to cryptology
Authentication
Integrity
Key management and distribution
Attacks
Access control and firewalls
VPNs

Prerequisites
TLEN 5330 Data Communications I
TLEN 5310 Telecommunication Systems

Textbook(s)
Hardware/Software Requirements
Internet and e-mail access. Students will access course materials using CULearn. Go to CULearn.colorado.edu for logon information and browser settings.

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Bio: Ken Baker holds a PhD, MS, and BS in EE. Prior to joining the faculty at CU, he has held various positions related to RF network planning and new product research and development at both Nortel and Qualcomm Inc. Additionally, he has participated in the rollout and optimization of CDMA, EVDO and WCDMA networks worldwide. His background also includes wireless industry consulting and training. He holds twelve patents in cellular telephone communication system technology. Prof. Baker's research is in the area of wireless telecommunications and networking.