CS 4390: NETWORK ARCHITECTURE AND APPLICATIONS

Semester Hours: 3.0  
Contact Hours: 3

Coordinator: Ray Kresman

Text: Computer Networking: A Top-Down Approach

Author(s): KUROS AND ROSS

Year: 2017, 7th edition

SPECIFIC COURSE INFORMATION

Catalog Description:

Layered architectures and protocols. TCP/IP protocol suite. Client-server communication paradigm. Application architectures such as push and pull technologies, web services, cloud and microservices, multimedia. Scalability and performance. Credit cannot be earned for both CS 3270 and CS 4390 or CS 5390. Prerequisite: Grade of C or better in CS 3080.

Course type: REQUIRED

SPECIFIC COURSE GOALS

- Justify the need for, and describe the working of, layered protocol suites, such as TCP/IP.
- Develop client-server applications using TCP/IP.
- Assemble/disassemble packets and translate address as it traverses networks.
- Solve sample problems using popular routing protocols.
- Motivate the need for and summarize the details of service architectures, such as web services and micro-services.
- Describe the details, including payload types and synchronization of multimedia application protocols.
- Explain and distinguish the various service types supported by internet applications – for example, best effort, streaming.
- Construct the working of certain types of congestion control mechanisms.
STUDENT OUTCOMES ADDRESSSED BY THIS COURSE

• B.1 Analyze a given problem, and identify and define the computing requirements appropriate to its solution
• B.3 Apply mathematical foundations, algorithmic principles, and computer science theory as appropriate in modeling and solving real-world problems
• B.8. An ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs

LIST OF TOPICS COVERED

• Layered Protocol Architectures (~ 5%)
  o TCP/IP and OSI
• TCP/IP (~ 10%)
  o LAN and other components
  o Service view
  o TCP vs UDP, and more
  o Packet formats
• Client-server Applications (~ 15%)
  o Thread vs Process
  o Sockets, RPC, etc
  o Scalability
• Transport and Routing (~ 15%)
  o Reliable vs. unreliable transfer
  o Congestion control
  o Routing protocols
• Service Architectures (~ 15%)
  o Web services
  o Microservices
  o P2P and others
• Multimedia (~ 10%)
  o Real-time/streaming, VoIP
- Quality of Service
- Wireless Communication (~ 10%)
  - Wi-Fi
  - Cell networks
- Media and Performance (~ 10%)
  - Signal strength
  - Compression and error detection
  - Delay, loss, throughput
- Emerging/Future Trends (~ 10%)
  - Parallel and distributed computing
  - Security
  - Others