CS 5390 : 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. Prerequisite: Full Admission to MS in CS program or consent of department. Credit cannot be earned for both CS 4390 or CS 5390.

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.
- I can analyze relevant research and communicate my findings.
STUDENT OUTCOMES ADDRESSED 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