CS 5390: NETWORK ARCHITECTURE AND APPLICATIONS

<table>
<thead>
<tr>
<th>Semester Hours:</th>
<th>3.0</th>
<th>Contact Hours:</th>
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<tbody>
<tr>
<td>Coordinator:</td>
<td>SANKARDAS ROY</td>
<td>Text:</td>
<td>COMPUTER NETWORKING: A TOP-DOWN APPROACH</td>
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<tr>
<td>Author(s):</td>
<td>KUROS AND ROSS</td>
<td>Year:</td>
<td>2017, 7th edition</td>
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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

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%)
  - TCP/IP and OSI
- TCP/IP (~ 10%)
  - LAN and other components
  - Service view
  - TCP vs UDP, and more
  - Packet formats
- Client-server Applications (~ 15%)
  - Thread vs Process
  - Sockets, RPC, etc
  - Scalability
- Transport and Routing (~ 15%)
  - Reliable vs. unreliable transfer
  - Congestion control
  - Routing protocols
- Service Architectures (~ 15%)
  - Web services
  - Microservices
  - P2P and others
- Multimedia (~ 10%)
  - Real-time/streaming, VoIP
  - Quality of Service
- Wireless Communication (~ 10%)
  - WiFi
  - 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