**CS 4390 : NETWORK ARCHITECTURE AND APPLICATIONS**

**Semester Hours:** 3.0  
**Contact Hours:** 3

**Coordinator:** SANKARDAS ROY

**Text:** COMPUTER NETWORKING: A TOP-DOWN APPROACH

**Author(s):** KUROS AND ROSS

**Year:** 2017, 7th edition

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**SPECIFIC COURSE INFORMATION**

*Catalog Description:*
Scoped 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: Grade of C or better in CS 3080.

**Course type:** Required

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**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.

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**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