

## CS 4390 : NETWORK ARCHITECTURE AND APPLICATIONS

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<i>Semester Hours:</i>	3.0	<i>Contact Hours:</i> 3
<i>Coordinator:</i>	Ray Kresman	
<i>Text:</i>	Computer Networking: A Top-Down Approach	
<i>Author(s):</i>	KUROS AND ROSS	
<i>Year:</i>	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.

## COMPUTER SCIENCE STUDENT OUTCOMES ADDRESSED BY THIS COURSE

- CS 1 Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions
- CS 2 Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline
- CS 6 Apply computer science theory and software development fundamentals to produce computing-based solutions

## 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%)
  - 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

#### COMPUTER SECURITY TOPICS

Faculty who recently offered CS 4390 have discussed and identified a list of topics related to computer security in this course. Below is a list for instructors to incorporate. (\*) indicates topics that are mandatory.

<b>Security Topic</b>	<b>Description</b>	<b>Textbook Reference<sup>1</sup></b>	<b>Estimated Class Hours</b>
*CIA triad	Confidentiality, integrity, and availability	Chapter 8	1
*Public/private keys	How to achieve CIA triad via public/private key	Chapter 8	1
*E-commerce security	Security elements of e-commerce transactions over the web (e.g., HTTPS)	Chapter 8	1

<sup>1</sup>Computer Networking by Kurose & Ross, 7<sup>th</sup> Edition.