Knight Foundation School of Computing and Information Sciences

Course Title: Net-centric Computing   **Date:** 3/22/2019

Course Number: CNT 4713

Number of Credits: 3

Subject Area:	Subject Area Coordinator: Dong Chen email: dochen@cs.fiu.edu
Catalog Description: This course covers networking fundamentals, network security, network applications, mobile and wireless computing. The course focuses on network programming, including sockets and web programming concepts.	
Textbook: "UNIX Network Programming: The sockets networking API, 3/e", by W. Richard Stevens, Bill Fenner, and Andrew M. Rudoff. ISBN-10: 0131411551. ISBN-13: 978-0131411555. Addison-Wesley.	
References: "Computer Networks, 5/e", by Andrew S. Tanenbaum, and David J. Wetherall. ISBN-10: 0132126958. ISBN-13: 9780132126953. Prentice Hall.	
Prerequisites Courses: COP 4338	
Corequisites Courses:	

Type: Elective

Prerequisites Topics:

- C programming on UNIX

Course Outcomes:

1. Master socket programming and transport layer services
2. Master web programming concepts
3. Be familiar with network architecture and OSI network model
4. Be familiar with internetworking, routing, and congestion control
5. Be familiar with link layer access control concepts
6. Be familiar with applied cryptography and other network security concepts
7. Be exposed to wireless and mobile networking, multimedia networking, and network management

Outline

Topic	Lecture Hours	Outcome

• Introduction to net-centric computing
     • Background and history of networking and the Internet
     • Network architectures and OSI model
     • Network protocols
     • Network computing models: client/server vs. peer-to-peer
     • Web programming
     • Network security
	2.5	3

• Transport layer services and socket programming
     • Transport layer protocols and services
     • Sockets
     • TCP socket programming
     • UDP socket programming
     • I/O multiplexing and select
     • TCP protocol
     • TCP congestion control
     • Other transport layer protocols
	10	1,4

• Network layer and link layer
     • Network layer, routing algorithms
     • Routing protocols and internetworking
     • Tunneling
     • Link layer, switching, and bridging
     • Multiple access control and Ethernet
     • Wireless LAN
	7.5	4,5,7

• Network applications and web programming
     • HTTP, Email, FTP, DNS, Telnet
     • VoIP, peer-to-peer applications
     • Web technologies: CGI, PHP, JavaScript, XML, AJAX
     • XML-RPC, SOAP and REST
	10	2,7

• Network security
     • Cryptography, symmetric-key algorithms (DES, AES)
     • Public-key algorithms (RSA), digital signatures
     • Network attacks and defenses (Kerberos, firewalls, SSL, VPN)
	6	6

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Course Outcomes Emphasized in Laboratory Projects / Assignments

	Outcome	Number of Weeks
1	Multithreaded web server (socket programming) Outcomes: 1	2
2	Overlay multi-hop routing Outcomes: 1,4,7	3
3	Collaborative white board Outcomes: 2	3
4	Cryptography Outcomes: 6	3

Oral and Written Communication: No significant coverage

Social and Ethical Implications of Computing Topics: No significant coverage

Theoretical Contents

1.	Network architecture and network design
2.	Transport layer, reliable data transfer, congestion control
3.	Routing algorithms
4.	Multiple access control, switching
5.	Cryptography

Problem Analysis Experiences

1.	Network programming (4 assignments)

Solution Design Experiences

1.	Design and implementation of an overlay multi-hop routing algorithm
2.	Design and implementation of a collaborative white board program

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The Coverage of Knowledge Units within Computer Science Body of Knowledge[1]

Knowledge Unit	Topic	Lecture Hours
AL9	Cryptographic algorithms; symmetric-key algorithms, public-key algorithms, authentication	3
NC1	Introduction to net-centric computing; internet history, network architecture, network protocols, networked applications	2
NC2	Communication and networks; ISO reference model, internetworking and routing, physical and data link layers,	15
NC3	Network security; network attacks and defenses	3
NC4	The web as an example of client-server computing; socket programming, HTTP	4
NC5	Building web applications; web programming	4
NC9	Wireless and mobile computing; wireless LAN, multi-hop routing	2

Assessment Plan for the Course & how Data in the Course are used to assess Program Outcomes

Student and Instructor Course Outcome Surveys are administered at the conclusion of each offering, and are evaluated as described in the School's Assessment Plan:
https://abet.cs.fiu.edu/csassessment/

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[1]See *Computing Curricula 2001 Computer Science*, by the Joint Task Force on Computing Curricula IEEE Computer Society Association for Computing Machinery; cf. Computer Science Body of Knowledge, page 17. Available at:
https://www.acm.org/binaries/content/assets/education/cs2013_web_final.pdf