ITM 604: Data Communication, Networks and Security
University at Albany, State University of New York
Spring 2005

Instructor Information
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Class Information
Time: TH 9:05am-12:10pm
Location: BA233
Dates: January 20 - April 28
Credit(s): 3
Call #: 4321
Available Lab(s): BA222

Course Overview
This course covers Data Communications, Computer Networking and Computer Security. The first module of the course focuses on communications where we discuss fundamentals of signal transmission, transmission hardware and basic communication concepts such as error control and multiplexing. The second module of the class covers Network Topologies, the OSI model, and the TCP/IP protocol suite. This module also covers the various architectures used on the Internet, including client-server, peer-to-peer and n-tier architectures. Also covered is network switching and schemes for routing data on the network. Students will have the opportunity to use network simulation tools. In the third module of the class, vulnerabilities of computer networks and techniques for protecting networks and data are discussed. Basic elements of symmetric and asymmetric cryptography are discussed. Secure Electronic Commerce, involving secure transmission, authentication, digital signatures, digital certificates and Public Key Infrastructure is also presented. Issues in privacy, ethics and policies are also discussed where students study technologies like Web Bugs and Carnivore and debate on ethical issues related to privacy.

Learning Objectives

Students will learn:
Basic concepts of communications & computer networks
How to use simulation tools for designing & optimizing communication network topologies
Basic concepts of cryptography and Public Key Infrastructure
How to analyze security threats to computer networks and how to protect them
How to research in the focused area of computer networks & network security
Critical thinking skills via debates on the ethics and legal issues involved in electronic data access

Immersion Classes
The class can be supplemented upon student request by immersion classes which are full day classes covering special topics in Computer security. The content of the classes may vary based on the interest of the audience and the availability of the instructor. This is not a mandatory part of the class and is strictly volunteer (without any grade implication) based on the interests of the students. The three potential classes are:

Security Programming using Java - In this class the students learn the basic cryptography classes in java and learn encryption and decryption of data. The students also learn to create message hashes, digital signatures and certificate servers.

Distributed Computing using Jini - The class will be involved in the development of a service based architecture using Jini. Each student will develop a different service and the class will call each others services. The goal of the class is to teach the students the working and development of a peer-to-peer system. As a part of the class the students will learn how to install, configure and deploy a peer-to-peer system.

Class Structure
For the most part, the first half of each class will be conducted in the classroom and the second half of the class will take place in the computer lab. The students will learn basic concepts in the first half of the class and go through an exercise applying these concepts in the second half. Please come prepared with the readings since the class will move at a brisk pace.

Assignments
There will be assignments that need to be done to understand the subject material. Please work individually on all assignments unless otherwise specified. It is okay to discuss the concepts and questions with other colleagues, but it is improper to copy each other's work. Not all assignments will be graded, however, please make sure that you complete all your assignments. The assignments must be submitted in the class one week after the assignment with your name and the assignment number clearly marked on the assignment sheet.

Text & Reference Books
Text: Data Communications & Computer Networks: A Business Users's Approach by Curt M. White
Text: Security In Computing (Third Edition) by Charles P. Pfleeger & Shari Lawrence Pfleeger
Reference: Hackers Beware by Eric Cole
Reference: Professional Java Security by Jess Garms and Daniel Somerfield

Grading
Homework: 50%
Exam: 50%

Course Schedule

No.	Date	Topics	Readings	Instructor
1	1/20	Introduction to Computer Networks and Data Communication	1, 2	Crnkovic
		Fundamentals of Data and Signals; The Media	3	
2	1/27	Making Connections. Multiplexing	4, 5	
		Errors, Error Detection And Error Control	6	
3	2/3	Local Area Networks	7, 8, 9	
		WAN	10	
4	2/10	Exam 1	Chapters 1-10	
		Network Design and Management	14	
5	2/17	Network Design and Management (continued)	14	
		Telecommunication Systems; Implementation in various businesses	12	
6	2/24	Introduction to Internet; OSI Model		Goel
		Network Architectures		
7	3/3	Web Services Architecture		
		Web Services Applications		
8	3/10	Security Fundamentals		
		Hacker Attacks		
9	3/17	Hacker Attacks		
		Watermarking and Steganography		
10	3/31	Computer Forensics / Hacking Lab		
		Computer Forensics / Hacking Lab		
11	4/7	Cryptography- Symmetric & Asymmetric		
		Public Key Infrastructure, Digital Signatures, Digital Certificates		
12	4/14	Current Topics		
		Analyzing Computer Security Risk		

No.	Date	Topics	Readings	Instructor
13	4/21	Security Policy		
		Managing Computer Security Risk		
14	4/28	Exam 2		
		Ethics and Legal Issues		