

ITM 416: Data Communications, Networks, and Security
University at Albany, State University of New York
Spring 2006 Syllabus

Instructor Information

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Offices	BA332	BA310b
Office Hours	MW 10-11:30am (and by appointment)	M 12:30pm - 2:00pm (and by appointment)
Web sites	WebCT	www.albany.edu/~goel/classes/spring2006/itm416

Class Information

Time: Mondays/Wednesdays 8:30am - 10:05am

Location: BA 233

Dates: January 23 – April 24

Credit(s): 3

Call #: 7619

Available Lab(s): Undergraduate Lab

Text & Reference Books

Text (Crnkovic)- Data Communications & Computer Networks: A Business Users's Approach, Third Edition by Curt M. White, ISBN: 0619160357

Text (Goel)- Secrets and Lies: Digital Security in a Networked World (paperback) by Bruce Schneier, ISBN: 0471453803

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. Different wired and wireless media, such as, fiber optic, coaxial cables, cell phones, satellite microwave are also presented. Students learn the pros and cons of selecting different media types. In addition, 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 simple network simulation tools. In the second 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 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:

1. Basic concepts of communications & computer networks
2. Hardware and software components in computer networks
3. Elements of network design and management
4. How to use simulation tools for designing & optimizing communication network topologies
5. Basic concepts of cryptography and Public Key Infrastructure
6. How to analyze security threats to computer networks and how to protect them
7. How to research in the focused area of computer networks & network security
8. Critical thinking skills via debates on the ethics and legal issues involved in electronic data access

Grading

All students are expected to follow University at Albany guidelines on academic integrity (see the Academic Integrity section for more detail). If any assignment or project submission contains any material (text, diagrams, code, etc.) generated by others (not on your project team), your submission must clearly indicate the source of such material. Failure to indicate the source of the material will be treated as plagiarism. Individuals must work on their own on assignments unless otherwise specified by the professor.

Homework- 50%

Assignments given in any week is due at the beginning of the class on the same day in the following week. There will be a penalty for late assignments unless there is a very pressing reason for the delay. Please work individually on all assignments. Stop by the instructor offices if you have difficulty in understanding the assignment or the course material discussed in the class. Assignments can be in-class or take-home and will be designated as individual or group assignments depending on the specific assignments. Please see the Assignments section of the course site for further details and guidelines.

Assignments for the first part (Prof. Crnkovic)

There are two groups of 4 group projects (with a short presentations). Each team (2 or 3 students make a team) will be assigned one project from each group of projects (if the number of students in class is small, we will not use all projects). The max number of points is 2 times 25, making 50. In addition, there are two homework assignments (individual). The total number of points is 50. All assignments should be uploaded into the WebCT assignments folder (if a group project, ALL group members upload both, a text file and a PPT file).

Assignments for the second part (Prof. Goel)

The paper assigned in the second part of the class should be done in pairs or individually and no more than two people in a team and will focus on a security-related topic. If you work in groups of two, make sure that the work is equally divided. The point writing a paper is so that you learn how to do in-depth research on a topic, think carefully and deeply about the issues, and express your own ideas as clearly as possible. Suggested research topics will be provided and students will be given separate topics. Please see the Projects/Papers section of the course site for further details and guidelines.

Exams- 50%

There will be three exams in the class. The first two exams will be multiple-choice or short essay questions (open-book, no notes). It will cover what is learned during the first two-thirds of the class with Professor Crnkovic. The third exam will consist of multiple sections (essay-style) in which will cover networking and security. The will have to apply a majority of what has been learned during the last two-thirds of the semester in order to assess individual performance. This can include encryption, digital signature creation, and other topics discussed in the last two-thirds of the course. Students may use the recommended texts, class notes, and PowerPoint presentations. No use of electronic devices (laptops, cellphones, PDA's, etc.) is allowed during testing.

Based on that, the max number of points for homework assignments and projects is 150 (100 Crnkovic, plus 50 Goel) and from tests 150 (100 Crnkovic, plus 50 Goel) making the grand total of 300 points. Based on previous experiences, 93% or more will be needed for an A.

Tentative Course Schedule
(Smaller changes are possible, please check the WebCT for the latest version)

No.	Date	Topics	Readings	Instructor
1	1/23	Introduction / The Big Picture of Networks	Chapter 1	Crnkovic
2	1/25	Fundamentals of Data & Signals	2	
3	1/30	Media Types	3	
4	2/1	Connections	4	
5	2/6	Multiplexing	5	
6	2/8	Error Detection & Control	6	
7	2/13	Exam I, homework 1 due	1-6	
8	2/15	Project 1 presentations; Intro to LAN	7	
9	2/27	LAN	7	
10	3/1	Internet; homework 2 due		
11	3/6	LAN	8,9	
12	3/8	Metropolitan and Wide Area Networks	10	
13	3/13	Telecom Systems, Intro to Network Design and Management	12, 14	
14	3/15	Network Design and Management, cont. Exam II; Project 2 presentations	14	
15	3/20	Networking/ OSI Model	Notes	Goel
16	3/22	Introduction to Security/Security Threats I	Notes	
17	3/27	Security Lab (Password Auditing)	Notes	
18	3/29	Security Threats II	Notes	
19	4/3	Security Lab (Penetration Testing)	Notes	
20	4/5	Exam III	Notes	
21	4/17	Final Paper	Notes	