Software Engineering 4C03
Computer Networks and Computer Security
Winter 2001

Course Outline

Revised: 5 January 2001

Instructor

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Course Web Site

http://www.cas.mcmaster.ca/~wmfarmer/SE-4C03-01

Lecture Schedule

MW	8:30–9:20	ABB 270
F	10:30–11:20	ABB 270

Teaching Assistant

To be announced.

Calendar Description

"Network structures, protocol design. Protection against data theft, data destruction, and denial-of-service attacks. Access right control. Encryption. Weakest pre-condition analysis. Low data-rate attacks."

Mission

"The mission of the course is to teach students (1) how to design software for efficient communication between computers and (2) how to develop software systems that are robust and secure against malicious attempts to use them in unauthorized ways, to prevent their proper functioning, or to steal information from them. The student should learn how computer networks are organized and about the protocols used in computer communication. The course will also discuss threats to the security of computers and networks and the techniques that can be used to counter these threats. The discussion must include physical security, software structure and security, encryption techniques, performance issues, and user authentication. Students should know how to select the appropriate security techniques for their situations. The course will discuss the building of efficient reliable networks using unreliable components and examine the role of scale (size of networks) in the design of network software."

Texts

1. **Required**: D. E. Comer *Internetworking with TCP/IP: Principles, Protocols, and Architectures, Vol. 1, Fourth Edition*, Prentice Hall, 2000. ISBN: 0130183860.

2. **Optional**: C. Brenton, *Mastering Network Security*, Sybek, 1999. ISBN: 0782123430.

Work Plan

There will be lectures, six lab exercises, a research and presentation project, a midterm test, and a final exam. The lectures will be given by the instructor during regular class sessions.

The lab exercises will be performed by the students outside of class usually working in teams of two or three people. The lab exercises will be performed on an experimental "Little Internet" of Intel computers running Linux located in GS 342B. The Little Internet will be configured and secured by the students.

Each student will individually do a research and presentation project on some new network or security technology. The project will consist of three parts:

1. A proposal for what technology to investigate.

2. A 10-minute oral presentation of the technology to the class.

3. A 3-page written paper describing the technology.

Further details concerning the project will be provided later.

The midterm test will be done in class on February 14, 2001. The final exam will be 2 hours long. It will take place on the date scheduled by the University.

Log Book

Each student is expected to keep a detailed, up-to-date log book that records all the steps performed on the lab exercises. Sources of information, consultations with instructors and fellow students, successful and failed experiments, discovered errors, and lessons learned should be recorded. The entries in the log book should be listed chronologically with dates and times.

A copy of the student's log book must be included as part of each final lab exercise report.

Tentative Schedule

00. Preliminaries
01. Information Security
02. Physical Networks
03. The Internet Model and TCP/IP
04. Internet Protocol (IP)
05. Transmission Control Protocol (TCP)
06. Computer and Network Security Threats
07. Encryption
08. Common Network Services
09. Defense Mechanisms
10. Project Presentations

Policy Statements

1. *Significant study and reading outside of class is required.*
2. *Regular class attendance is required.*
3. *The student is expected to ask questions during class.*
4. The student is welcome to discuss assignments with other students, but all such interactions must be recorded in the student's log book. Lab exercises must be the student's own work.
5. A student may use his or her texts and notes during the midterm test and final exam.
6. Lab exercises may not be turned in late and the midterm test may not be taken later without *prior* approval from the instructor.
7. The instructor reserves the right to require a deferred final exam to be oral.
8. Calculators are permitted during the midterm test and final exam.

9. "The Faculty of Engineering is concerned with ensuring an environment that is free of all adverse discrimination. If there is a problem, that cannot be resolved by discussion among the persons concerned, individuals are reminded that they should contact their Department Chair, the Sexual Harassment/Anti-Discrimination Officer (SHADO), as soon as possible."

10. "Students are reminded that they should read and comply with the Statement on Academic Ethics and the Senate Resolutions on Academic Dishonesty as found in the Senate Policy Statements distributed at registration and available in the Senate Office" (see Senate Secretariat, Gilmour Hall, Room 104, 525-9140 or 529-7070, ext. 24337).

11. *Suggestions on how to improve the course and the instructor's teaching methods are always welcomed.*

Grading

The course grade will be based on the student's performance on the lab exercises, project, midterm test, and final exam as follows:

Lab exercises	20%
Project	20%
Midterm test	20%
Final exam	40%
Total	**100%**

Notes:

1. *A student who fails the final exam automatically fails the course.*

2. A student's final score will be reduced by one half point for each missed class (there is no penalty for the first three missed classes).

3. The instructor reserves the right to adjust the grades for a lab exercise, midterm test, or final exam by increasing or decreasing every score by a fixed number of points.