Software Engineering 4C03
Computer Networks and Computer Security
Winter 2002

Course Outline

Revised: 17 January 2002

Instructor

Dr. William M. Farmer
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Tentative office hours: MT 14:30–15:20, WR 10:30–11:20

Course Web Site

`http://www.cas.mcmaster.ca/~wmfarmer/SE-4C03-02`

Lecture Schedule

MW	8:30–9:20	HH 110
F	10:30–11:20	HH 110

Teaching Assistants

Kevin Lou (`loug@mcmaster.ca`)
Yonghua Lou (`louy@mcmaster.ca`)

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."

Required Text

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

Work Plan

There will be lectures, five 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 ITB 238. 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 two parts:

1. A proposal for what technology to investigate.
2. A Web page presentation of the technology.

Further details concerning the project will be provided later.

The midterm test will be held 10:30-11:20 Friday, February 15, 2001, in ABB B163. 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. Overview of Encryption
08. Common Network Services
09. Defense Mechanisms

Policy Statements

1. Significant study and reading outside of class is required.
2. Regular class attendance is required. Attendance will be taken, and absences will be excused only in highly exceptional cases.
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. The lab exercise reports and the research and presentation project Web page 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 (5)	20%
Project (proposal and Web page)	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 *five* missed classes).

3. A portion of the research and presentation project Web page will be graded by the class.

4. 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.