Course Information and Syllabus

The goal of this course is to acquaint the students with security issues in multi-user information systems and computer networks and to provide them with training in the fundamental techniques, particularly cryptography, for security and their applications in practical areas such as electronic commerce, network intrusion protection, and security management.

Instructors

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Lectures

Tuesday 2:20–5:20PM, Conference Room 2, College of Management, Building I (level 4)

TAs and Office Hours

To be announced by the instructors

Prerequisites

Operating Systems and Computer Networks

Textbook

Cryptography and Network Security: Principles and Practices, 4th Edition, W. Stallings, Prentice Hall, 2006. (Note: **be sure to check out the errata list on the Web site of the book!**)
Supplementary readings.

Syllabus/Schedule

We will study the design and underlying principles of **automated tools for protecting information**, including software and data, *stored on computers or communicated over networks*. The main focus will be on the fundamentals and applications of **cryptographic technology**. We will follow mainly the textbook of W. Stallings and enhance the contents with class notes and supplementary readings.

- Introduction: basic concepts, architecture, model, etc. (.5 week: 09/15a)
- Symmetric Cryptography: classical techniques, block ciphers, DES, finite fields, AES, stream ciphers, applications, etc. (3.5 weeks: 09/15b, 09/22, 09/29, 10/06)
- Public-Key (Asymmetric) Cryptography: number theory, RSA, key management, ECC, etc. (4 weeks: 10/13, 10/20, 10/27, 11/03)
- **Midterm** (**2009/11/10**)
- Authentication, Hash Algorithms, and Digital Signatures (3 weeks: 11/17, 11/24, 12/01)

- Network Security: IPsec, virtual private networks (VPNs), IP traceback, firewalls, denial of service, etc. (3 weeks: 12/08, 12/15, 12/22)
- Field Trip to the Acer eDC (12/29)
- System and Application Software Security: malicious software (including viruses), Web application security, etc. (1 week: 01/05)
- **Final** (**2010/01/12**)

Web/FTP Site

`http://www.im.ntu.edu.tw/~tsay/courses/is/` or `ftp://140.112.106.6/` (up to `106.10`; must have an account at im.ntu.edu.tw for FTP; guest account available)

Grading

Midterm 35%, Final 35%, Homework 10%, Term Project 20%.

References

[1] *Cryptography and Network Security: Principles and Practices, 4th Edition*, W. Stallings, Prentice Hall, 2006. (Note: textbook of this course.)

[2] *Introduction to Cryptography, 2nd Edition*, J.A. Buchmann, Springer, 2004. (Note: an introductory book self-contained with a succinct coverage of mathematical foundations.)

[3] *Applied Cryptography: Protocols, Algorithms, and Source Code in C, 2nd Edition*, B. Schneier, John Wiley & Sons, 1996. (Note: a very comprehensive book on cryptography and its applications.)

[4] *Security in Computing, 4th Edition*, C.P. Pfleeger and S.L. Pfleeger, Prentice Hall PTR, 2006. (Note: similar to [1] in scope and in technical depth. It covers fewer encryption algorithms, but is more comprehensive in system/program security. It also has chapters on data base security, security management, and legal and ethical issues.)

[5] *Firewalls and Intranet Security: Repelling the Wily Hacker, 2nd Edition*, W.R. Cheswick, S.M. Bellovin, and A.D. Rubin, Addison-Wesley, 2003.

[6] *Building and Managing Virtual Private Networks*, D. Kosiur, John Wiley & Sons, 1998.

[7] *Building SET Application for Secure Transactions*, M.S. Merkow, J. Breithaupt, and K. Wheeler, John Wiley & Sons, 1998.

[8] *Practical UNIX and Internet Security, 3rd Edition*, S. Garfinkel, G. Spafford, and A. Schwartz, O'Reilly & Associates, 2003.

[9] *Secure Programming with Static Analysis*, B. Chess and J. West, Addison-Wesley, 2007.

[10] *The OWASP Website*, `http://www.owasp.org/`. (Note: a website dedicated to Web application security.)

[11] *Operating System Concepts, 8th Edition* (Chapters 14 and 15), A. Silberschatz, P.B. Galvin, and G. Gagne, Wiley, 2008.

[12] *Computer Networks, 4th Edition* (Chapter 8), A.S. Tanenbaum, Prentice Hall, 2002.

[13] *Distributed Systems: Concepts and Design, 4th Edition* (Chapter 7), G. Coulouris, J. Dollimore, and T. Kindberg, Addison-Wesley, 2005.