Introduction to CSS 322 – Security and Cryptography

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Welcome

- To a first course on the theory and technologies that provide secure computers and networks

- A 3rd year course for computer scientists

- Course website available from http://ict.siit.tu.ac.th/

Who Am I?

- Steve Gordon
- Assistant Professor in ICT (started in October 2006)
- 2001-2006: Researcher/Lecturer in Australia
  - Telecommunications, Internet, Wireless Networks, …
- Contact details:
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  - Phone: ext 2014
  - Consultation: email or phone for appointment; see website for availability

Prerequisites

- There are no formal prerequisites, but I assume you know:
  - Discrete mathematics (logic, prime numbers, …)
  - Basics of data communications (OSI 7-layers)
  - Operating system concepts (processes, RPC, …)
  - Software design principles (divide-and-conquer, functions, …)
  - Programming languages (e.g. C, C++, Java or similar)

What will you learn in CSS 322?

- The role of security in computers and networks
- Theory and concepts behind secure systems
  - Cryptography
- Details of important and popular algorithms
  - DES, AES, RSA, Digital Signatures, …
- Internet security techniques and attacks
  - Layered security, viruses, spyware, …
- Details of Internet security protocols
  - IPsec, SSL/TLS, PGP, …
- Legal and ethical issues and current trends

Why is CSS 322 Useful?

- It will help you get a job!
  - Designing and writing secure applications
  - Designing and managing secure systems (networks, computers)
  - Security certifications (e.g. CISSP, GIAC) are much more valuable than networking/computer certifications (e.g. Microsoft, Cisco)
- You will have an understanding of:
  - The concepts behind most of today's security protocols
  - Details of popular Internet security protocols and systems
  - Techniques for attacking and defending networks
  - Legal and ethical issues that arise in computer security

Course Structure

- Lectures
  - 3 hours per week
- Self study
  - At least 6 hours per week
  - Browsing lecture notes BEFORE and AFTER class, reading the textbook and other materials, studying for quizzes and exams, preparing assignments, consultations, group discussions, …
- Assessment

Assessment

- Quizzes
  - 10 minute quizzes at the beginning of selected lectures
  - Cover the topics since the last quiz
  - Test your understanding of lectures, reading materials and homework problems
  - Closed book
  - 8 quizzes; 5 best marks will count
  - 15% total (3% each)
- Assignment
  - Set of problems for you to complete over a number of weeks
  - Test your in-depth understanding of concepts and protocols
  - Open book
  - 20%

Assessment

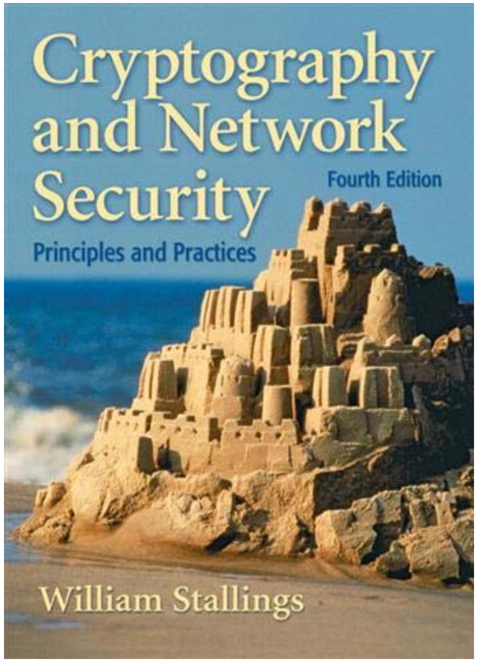
- Mid-term Exam
  - Test your knowledge and understanding of all material to date
  - Use as practice for final exam
  - Closed book
  - 20%
- Final Exam
  - Closed book
  - 45%
- For advice:
  - Closed book assessment is not a memory test (e.g. I won’t test your ability to remember S-boxes) – it’s a test of understanding
  - We will discuss types of questions and topics before exam

Academic Misconduct

- What is it?
  - Plagiarism, cheating, copying, “lending”, …
- Examples
  - Copying assignment answers from friend (verbal or written)
  - Giving your assignment (or some answers) to a friend
  - Looking at neighbours answers during quiz/exam
  - Copying sentences/paragraphs/code from textbooks/Internet without acknowledgement
- Results
  - If detected, questions or entire assessment item may get 0 marks
- Discussion with friends is encouraged; telling your friends answers is not!

Learning Materials

- Lectures
  - Attend, listen and ask questions!
  - Will include examples and demonstrations
- Lecture notes
  - PDF of Powerpoint slides
  - Available on website and from document services
  - Aim to have available 1 day before lecture
  - Make your own notes
- Recommended Textbook
  - "Cryptography and Network Security" by Stallings
  - 4th Edition (90% of my content is based on this)
- Other Useful Textbooks
  - Earlier editions of Stallings textbook
  - "Network Security" by Kaufman, Perlman, Speciner
  - These other textbooks should only be used as supplementary readings



Learning Materials

- Recommended Readings
  - For selected topics I will list papers/chapters/websites/standards that should be read
  - These will be publicly available on the Internet or available through the Library (electronic or hardcopy)
- Homework Problems
  - Problems from the textbook and other sources will be given
  - Answers will not be assessed, but discussed in lectures
- Course Website
  - All materials will be available from the website
  - Announcements, selected solutions will be on the website
- Mailing list (access via course website)
  - You must subscribe (as will be used for announcements)

Is This Course Difficult?

- Computer and network security looks very hard!
  - Theory of computer security includes lot of mathematics
    - Example: Stallings textbook contains details of many algorithms
  - Network security protocols can be very complex
    - Example: IPsec (and associated IKE) – 200+ pages of standards
- I will try to make it look easy!
  - Not all mathematical details will be covered
  - Go through algorithms SLOWLY, using examples
  - Combine technical details of protocols/algorithms with demonstrations of real systems
  - Cover only selected (interesting!) protocols
  - May adapt topics based on your feedback (including quiz results)