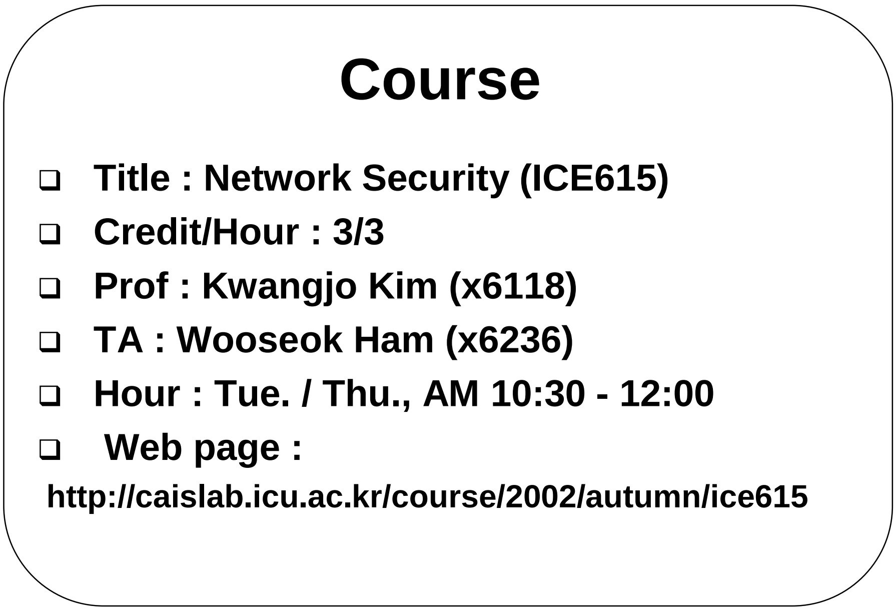
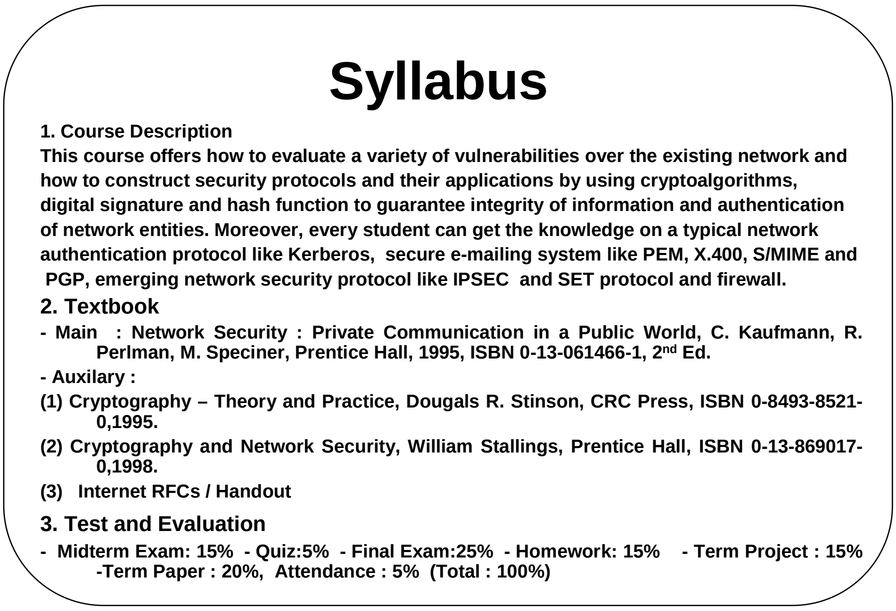


Course

- ❑ Title : Network Security (ICE615)
- ❑ Credit/Hour : 3/3
- ❑ Prof : Kwangjo Kim (x6118)
- ❑ TA : Wooseok Ham (x6236)
- ❑ Hour : Tue. / Thu., AM 10:30 - 12:00
- ❑ Web page :

http://caislab.icu.ac.kr/course/2002/autumn/ice615



Syllabus

1. Course Description

This course offers how to evaluate a variety of vulnerabilities over the existing network and how to construct security protocols and their applications by using cryptoalgorithms, digital signature and hash function to guarantee integrity of information and authentication of network entities. Moreover, every student can get the knowledge on a typical network authentication protocol like Kerberos, secure e-mailing system like PEM, X.400, S/MIME and PGP, emerging network security protocol like IPSEC and SET protocol and firewall.

2. Textbook

- Main : Network Security : Private Communication in a Public World, C. Kaufmann, R. Perlman, M. Speciner, Prentice Hall, 1995, ISBN 0-13-061466-1, 2nd Ed.

- Auxilary :

(1) Cryptography – Theory and Practice, Dougals R. Stinson, CRC Press, ISBN 0-8493-8521-0,1995.

(2) Cryptography and Network Security, William Stallings, Prentice Hall, ISBN 0-13-869017-0,1998.

(3) Internet RFCs / Handout

3. Test and Evaluation

- Midterm Exam: 15% - Quiz:5% - Final Exam:25% - Homework: 15% - Term Project : 15% -Term Paper : 20%, Attendance : 5% (Total : 100%)

Weekly Lecture

Week	Contents	Comment	Week	Contents	Comment
1	Introduction		9	Kerberos	HW#3
2	Digital Signature & Hash ft	TP Pro	10	E-mail Security I	
3	Basic Protocol	HW#1	11	E-mail Security II	HW#4
4	Applied Protocol	9/26	12	IPSEC	
5	Authentication System	HW#2	13	Web Security/Firewall	HW#5
6	TP Contest #1		14	TP contest	TP Paper
7	Midterm Exam	Written	15	Final Exam	Written
8	Authentication Protocol	TP Rep#2			

Term Projects(I)

2001

- □ **Anonymous Authentication in Dynamic Groups**
- □ **The implementation of security manager in Open Bluetooth Axis stack**
- □ **Cryptanalysis of the Rijndael**
- □ **Multiple Selective Mutual Authentication Protocol For Peer-to-Peer System**
- □ **Round Saving Bulletin-based Tripartite Electronic Lottery Protocol**
- □ **Secure Massager Protocol using Rijndael**
- □ **Trust analysis of web of trust**
- □ **Denial of Service Attacks and Countermeasures Analysis**
- □ **Study on X.509 certificates and CA’s Certificate path validation**
- □ **Compare Firewall Products**
- □ **Traitor tracing**
- □ **Implementing Secure IRC application with ElGamal**
- □ **Secure Distributed Document Sharing System**

Term projects(II)

2000

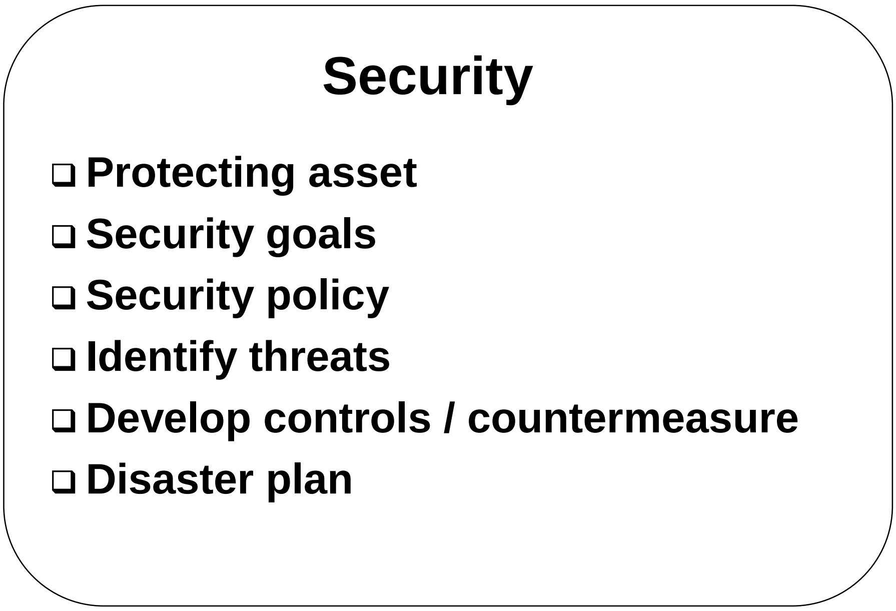
- □ **Anonymous Channel**
- □ **A Proposal of Efficient Wireless PKI**
- □ **DPA and Countermeasure**
- □ **Why IPSec is required for Multicast Networks**
- □ **Integrated Security Manager for scanning system's vulnerability**

1999

- □ **A Study on Key Management Protocol**
- □ **GMN Authentication Protocol**
- □ **Video copyright protection using digital watermarking**
- □ **A Study on the existing Network security Mechanism**
- □ **Authentication Method in Wireless Personal Area Network**

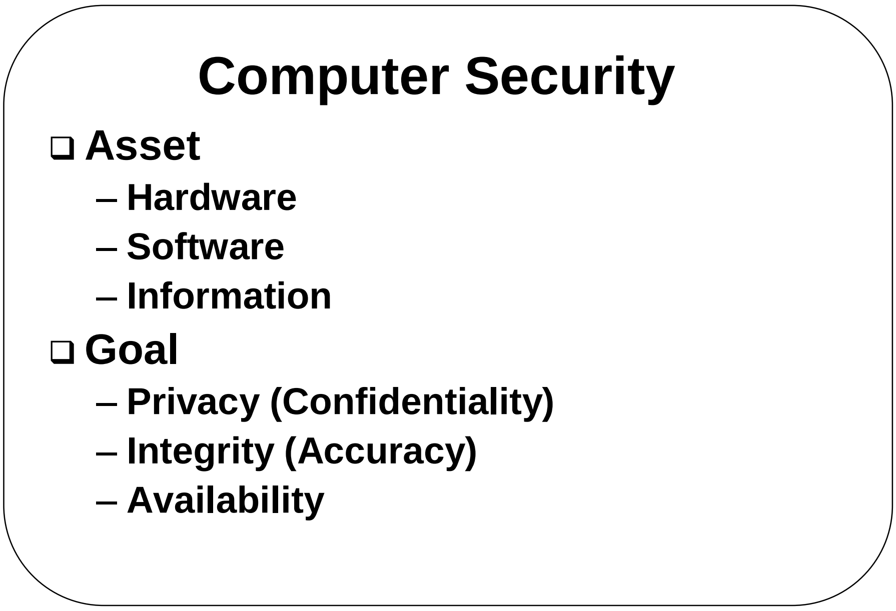
Why are you taking this course?

- ❑ **Need credits**
- ❑ **Thought a real professor was teaching**
- ❑ **Want to be rich and famous**
- ❑ **Security is a *hot issue.***
- ❑ **Want to be a information warrior**
- ❑ **Want to be a hacker**
- ❑ **Want to know DES, MD5, and AES**
- ❑ **Etc.**



Security

- ❑ Protecting asset
- ❑ Security goals
- ❑ Security policy
- ❑ Identify threats
- ❑ Develop controls / countermeasure
- ❑ Disaster plan



Computer Security

- ❑ Asset
  - – Hardware
  - – Software
  - – Information
- ❑ Goal
  - – Privacy (Confidentiality)
  - – Integrity (Accuracy)
  - – Availability

Threats

- ❑ Natural and Physical
- ❑ Unintentional
- ❑ Intentional
  - – Interruption
  - – Interception
  - – Modification
  - – Fabrication

Threat Jargon

- ❑ Active (Program)
  - – Worm (independent) : program that replicates itself through network
  - – Logic bomb : malicious instructions that trigger on some event in the future, such as a particular time occuring
  - – Trojan horse : program that does something unexpected (and often secretly)
  - – Trapdoor : an undocumented entry point intentionally written into a program, often for debugging purposes, which can be exploited as a security flaw
  - – Virus : program fragment that, when executed, attached itself to other programs
- ❑ Passive
  - – Sniffer
  - – Wiretap
  - – TEMPEST
  - – Social Engineering (dumpster diving)

Countermeasures

- ❑ Education
- ❑ Physical protection
- ❑ Authentication
- ❑ Authorization
- ❑ Auditing

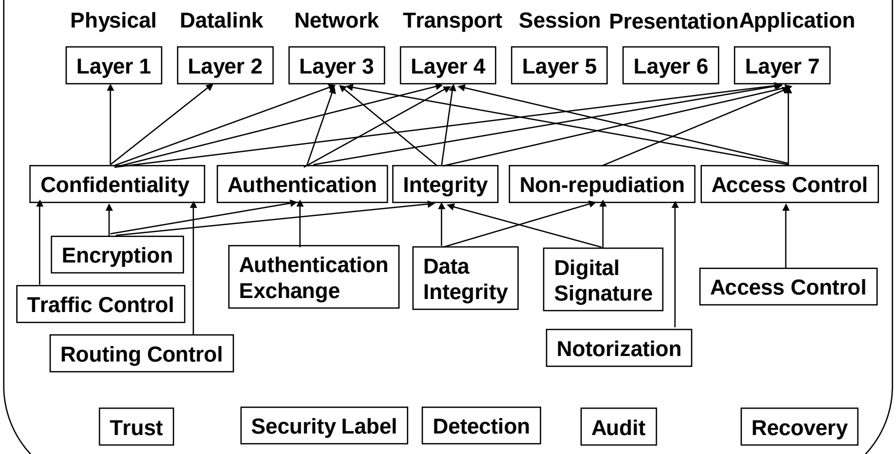
* Threat/countermeasures : never ending cycle

Risks and Countermeasures

	DB Storage	Host computer	Wireless Network	Router	Telephone FAX Terminal	Smart Card
Risk	Data /file deletion copy modification	OS / Application vulnerabilities Denial-of-service Virus Replay attack EMI/EMC	Wiretapping Data Modi-fication EMI/EMC	Protocol Vulnerability Traffic overload	Imperso-nation EMI/EMC	Imperso-nation Duplica-tion
Mea sure	Access Control Secure DBMS	Identification Vul. diagonsis Crypto API Digital Signature TEMPEST Anti-virus Secure OS	Cipher algorithm Hash ft.	Vulnerability checking Secure Router	Identification TEMPEST	Identifi-cation Secure COS High speed LSI

“Classification of Information Security”,KIISC Review, ‘98.3.p.7

Network Security



Are we at risk ?

❑ Assets

air defense
command and control
banking
power grid
phone system
traffic signal
corporate e-mail
refinery
DMV(Dep't of Motor Vehicles)
medical records
personnel records

nuclear weapon system
Taco Bell
electronic funds transfer
air traffic control
elevator
trains
grades
stock exchange
TV/radio
police record
payroll

❑ Information Warfare / Electronic Warfare

The Attackers

- Amature
- Insider (greed, disguntled)
- Kids
- Hackers
- Criminals
- Spies
- Sociopath(terrorist/vandal)

Why ?

- Money
- retribution
- sport
- pathological
- political/military

; easy to do, hard to catch, harder to prosecute

Detect & Correct

When an incident is detected :

- □ Don’t panic
- □ Identify the problem
- □ Stop the damage
- □ Assess the damage
- □ Save evidence, document
- □ Restore system
- □ Determine/eliminate cause
- □ Notify mgt, CERT (CERT-KR)

Handling the Intruder

- □ Monitoring the intruder
- □ Tracing the connection
- □ Contacting the intruder
- □ Terminating the intruder :-)

Legal/Political Issues

- ❑ estimate losses
- ❑ classified or military information
- ❑ some computer laws
- ❑ rules of evidence (hardcopy)

- US law classifies cryptography as a munitions !
; many encryption algorithm are patented/licensed.
key escrow.

- Should the citizens of a country have the right to
create and store documents their government
can't read ? -- Ron Rivest

Risk Assessment

- ❑ Identify assets and value
- ❑ Determine vulnerabilities
- ❑ Estimate probabilities
- ❑ Estimate losses
- ❑ Identify controls and their cost
- ❑ Estimate savings