



# *CSE 543*

## *Information Assurance and Security*

### *Introduction*

*Professor Stephen S. Yau*  
*Spring, 2017*



# *Information Assurance*

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- Information Assurance (IA) encompasses the *scientific, technical, and management disciplines* required to *ensure information security and quality*.
  - Security techniques as well as organization, operation management, policy, and legality, all play important roles.
  - Information quality also contributes to the overall information assurance of information systems and networks.



# *National IA Program*

- The *National Centers of Academic Excellence in Information Assurance Education (CAE IA/CD)* and the *National Centers of Academic Excellence in Information Assurance Research (CAE-R)* Programs are outreach programs designed and operated initially by the National Security Agency (NSA) in the spirit of Presidential Decision Directive 63, National Policy on Critical Infrastructure Protection, May 1998.
  - The program is now jointly sponsored by the NSA and the Department of Homeland Security (DHS) in support of the President's National Strategy to Secure Cyberspace, 2003.
  - The goal of the program is to reduce vulnerability in our national information infrastructure by promoting higher education in information assurance (IA), and producing a growing number of professionals with IA expertise in various disciplines.
- ASU has been certified as *both CAE IA/CD and CAE-R*



# *Presidential Decision Directive 63*

*May 22, 1998*

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- Explains key elements of the Clinton Administration's policy on critical infrastructure protection
- Intended to take all necessary measures to swiftly eliminate any significant ***vulnerability to both physical and cyber attacks on our critical infrastructures***, especially our ***cyber systems***.
- Ensures the ***continuity and viability of critical infrastructures***, including, but not limited to, telecommunications, energy, banking and finance, transportation, water systems and emergency services
- Available at:  
<https://www.fas.org/irp/offdocs/paper598.htm>



# *President's National Strategy to Secure Cyberspace (Feb. 2003)*

- President Bush directed the development of a National Strategy to *Secure Cyberspace* to ensure that America has a clear *roadmap* to protect its critical infrastructures.
- Provides *direction* to the federal government departments and agencies for cyberspace security
- Identifies *steps* that state and local governments, private companies and organizations, and individual Americans can take to improve our collective cyber security
- Prevent *cyber attacks* against America's critical infrastructures;
- Minimize *damage and recovery time* from cyber attacks that do occur.
- Available at: [https://www.us-cert.gov/sites/default/files/publications/cyberspace\\_strategy.pdf](https://www.us-cert.gov/sites/default/files/publications/cyberspace_strategy.pdf)



# *CAE IA/CD Program*

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- In order to be designated as a CAE IA/CD (Center of Academic Excellence in Information Assurance/Cyber Defense), each applicant must demonstrate its commitment to and capability for academic excellence in IA education.
  - Prerequisite: IA courseware must satisfy the *CAE IA/CD 4Y Knowledge Unit criteria*.
  - Satisfy the following:
    - Partnerships in IA Education
    - IA Treated as a multidisciplinary science
    - University encourages the practice of IA
    - Academic program encourages research in IA
    - IA curriculum reaches beyond geographic borders
    - Faculty active in IA practice and research, and contribute to IA literature
    - State-of-the-art IA resources
    - Declared IA Concentrations
    - Declared Center for IA education or research
    - Full-time IA faculty



# *IA Center at ASU*

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- The IA Center was designated by National Security Agency and Department of Homeland Security
  - As a *National Center of Academic Excellence in Information Assurance Education (CAEIAE)* since 2007 and re-designated as a *National Center of Academic Excellence in Information Assurance Education/Cyber Defense (CAE IA/CD)* under the new criterion in 2015 with five focus areas
    - *Data Management Systems Security*
    - *Digital Forensics*
    - *Network Security Engineering*
    - *Secure Cloud Computing*
    - *Secure Software Development*
  - As a *CAE-Research* since 2009, and re-designated under the new criterion since 2014



## *CAE-R Criteria*

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1. Engagement in serving on technical program committees of IA conferences, editing IA journals, hosting IA conferences and IA workshops, and collaborating with or assisting local government, business, and industry.
2. Producing students' thesis, dissertations, or projects, related to IA.
3. Strong peer-reviewed publications in IA by faculty and students
4. History of research funding related to IA





## *IA Courses at ASU*

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- CSE465: Information Assurance
- CSE466: Computer Systems Security
- CSE467: Data and Information Security
- CSE468: Computer Network Security
- CSE469: Computer and Network Forensics
- CSE539: Applied Cryptography
- CSE543: Information Assurance and Security
- CSE545: Software Security
- CSE548: Advanced Computer Network Security
- More courses in EE, IE and CIS (Business School)



## *IA Concentrations in MS and MCS in Computer Science*

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- A minimum of 15 credits in Information Assurance and related areas are required.
- MS thesis and the project portfolio for MCS must have a major portion of the content in the information assurance area



# *IA Concentration in PhD in Computer Science*

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- A minimum of 18 credits in Information Assurance and related areas are required.
- PhD dissertation must have a major portion of the content in the information assurance area



# *Benefits from CAE IA/CD or CAE-R Programs*

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- Formal recognition from the U.S. government, as well as opportunities for prestige and publicity, for their role in securing our nation's information systems.
- Students attending CAE IA/CD or CAE-R schools are eligible to apply for scholarships and grants through
  - The Department of Defense (DoD) Information Assurance Scholarship Program
  - The Federal Cyber Service Scholarship for Service Program (SFS) operated by National Science Foundation (NSF)



# *CSE 543 Course Overview*

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- A core course in the IA Concentration programs
- Objective: Provides basic and comprehensive understanding of the problems of information assurance (IA) and the solutions to these problems.



## *Prerequisites and reference book*

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- Knowledge of information systems, computer networks and their operations are required to be successful in this course.
- *Principles of Information Security*, 5th edition, by M. E. Whitman and H. J. Mattord, Thomson Course Technology, 2014
- Additional references in current literature, such as papers and other books.



# *Course Description*

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## ■ *Basic Concepts and Techniques*

- IA overview: concepts, trends, and challenges
- Security and privacy principles and guidelines
- Security and privacy strategies, and mission assurance
- Physical and personal security
- Evaluating systems for functionality and assurance
- Formal methods for security in software and applications  
Authentication protocols & access control mechanisms
- Malware
- Information Assurance in outsourcing, open source software, social networks, cloud computing and IoT.



## *Course Description (cont.)*

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- *IA Policy, Management, Legal and Ethical Issues*
  - IA policy
  - Administrative security controls
  - Contingency and disaster recovery planning
  - IA management and ethics
  - IA certification & accreditation
  - CISSP certification
  - IA risk analysis and management
  - Laws and authorities related to IA





## *Other Course Information (cont.)*

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- **Instructor:** Professor Stephen S. Yau
  - E-mail: [yau@asu.edu](mailto:yau@asu.edu)
  - Office hours: MW 4:30 p.m. to 5:30 p.m. and by appointments
  - Office: BYENG 488
- **Teaching Assistant:** Tamalika Mukherjee
  - E-mail: [Tamalika@asu.edu](mailto:Tamalika@asu.edu)
  - Office hours: MW 4:00 – 5:00 p.m. and also by appointments
  - Office: BYENG 487



## *Other Course Information (cont.)*

### ❑ **Background Survey**

- ❑ Survey form must be completed before *Sunday, January 15, 2017* (have to use your ASU email account to access the form)

<https://goo.gl/forms/13TWmbUXIx7TG6p62>

### ❑ **Evaluation**

- ❑ Two exams (60%)
- ❑ Group Course Project (40%)

Each student will be assigned to a group to conduct a group course project in some concepts of IA.