A research-based, interdisciplinary PhD in Information Assurance combines a strong security technical foundation with a security policy and social sciences perspective. It seeks to prepare graduates to advance the state-of-the-art of security in systems, networks and the internet in industry, academia, and government. The interdisciplinary nature of the program distinguishes it from traditional doctoral degree programs in computer science, engineering, or social sciences and makes it unique in the Boston area.

Students who choose the PhD in Information Assurance program have a strong desire to pursue academic research solving critical cyber security challenges facing today’s society. The PhD program is a natural path for students in the college’s Master of Science in Information Assurance and Cyber Security (http://www.ccs.neu.edu/graduate/degree-programs/master-of-science-in-information-assurance) program who want to pursue research and students with bachelor’s degrees and an interest in research-focused careers. Students who pursue careers in advancing the state-of-the-art of cyber security have an opportunity to gain:

- A strong technical foundation in cyber security and an interdisciplinary perspective based on policy and social science
- A path to a research-focused career coupled with depth in information assurance research at a leading institution, one of the earliest designees by NSA/DHS as a National Center of Academic Excellence (http://www.nsa.gov/ia/academic_outreach/nat_cae/index.shtml) in Information Assurance Research, Information Assurance/Cyber Defense, and Cyber Operations
- The opportunity to work with and learn from faculty who are recognized internationally for their expertise and contributions in information assurance, from Northeastern’s College of Computer and Information Science, the Department of Electrical and Computer Engineering, and the College of Social Sciences and Humanities
- Access to research projects at Northeastern’s research centers focused on security:
  - The Institute of Information Assurance (IIA) an interdisciplinary research center overseen by both the College of Computer and Information Science and the Department of Electrical and Computer Engineering in the College of Engineering and the recipient of a National Science Foundation grant to train the country’s next generation cyber corps
  - The International Secure Systems Lab (http://www.iseclab.org), affiliated with Northeastern, a collaborative effort of European and U.S. researchers focused on web security, malware and vulnerability analysis, intrusion detection, and other computer security issues
  - The ALERT Center (http://www.northeastern.edu/alert), where Northeastern is the lead institution, a multiuniversity Department of Homeland Security Center of Excellence involved in research, education, and technology related to threats from explosives

The benefits of the Boston area:

- World renowned for academic and research excellence, the Boston area is also home to some of the nation’s largest Department of Defense contractors and government and independent labs such as MIT Lincoln Lab, MITRE, and Draper Lab

### Degree Requirements

The PhD in Information Assurance degree requires completion of at least 48 semester credit hours beyond a bachelor’s degree. Students who enter with an undergraduate degree will typically need four to five years to complete the program, and they will be awarded a master’s degree en route to the PhD.

### Doctoral Degree Candidacy

A student is considered a PhD degree candidate after completing the core courses with at least a 3.400 GPA and either publishing a paper in a strong conference or journal or passing an oral exam that is conducted by a committee of three information assurance faculty members and based on paper(s) written by the student.

### RESIDENCY

One year of continuous full-time study is required after admission to the PhD candidacy. During this period, the student will be expected to make substantial progress in preparing for the comprehensive examination.

### DISSERTATION ADVISING

The doctoral dissertation advising team for each student consists of two information assurance faculty members, one in a technical area. When appropriate, the second faculty advisor will be from the policy/social science area.

### DISSERTATION COMMITTEE

A PhD student’s dissertation committee consists of the two members of the dissertation advising team plus two others: One is a member of the information assurance faculty, and the other is an external examiner who is knowledgeable about the student’s research topic.

### COMPREHENSIVE EXAMINATION

A PhD student must submit a written dissertation proposal and present it to the dissertation committee. The proposal should identify the research problem, the research plan, and the potential impact of the research on the field. The presentation of the proposal will be made in an open forum, and the student must successfully defend it before the dissertation committee after the public presentation.

### DISSERTATION DEFENSE

A PhD student must complete and defend a dissertation that involves original research in information assurance.

### AWARDING OF MASTER’S DEGREES

Students who enter the PhD in Information Assurance program with a bachelor’s degree have the option of obtaining a master’s degree from one of the departments participating in the program. To do so, they must meet all of the department’s degree requirements.

### Program Requirements

#### Bachelor’s Degree Entrance

Complete all courses and requirements listed below unless otherwise indicated.

### Milestones

**Qualifying exam and area exam**

**Annual review**
Course Requirements

Fundamentals
CS 5700  Fundamentals of Computer Networking  4
or EECE 7336 Digital Communications

Software
CS 5770  Software Vulnerabilities and Security  4

Security and Cyberlaw
IA 5200  Security Risk Management and Assessment  4
CS 6740  Network Security  4
or CS 6750 Cryptography and Communications Security
IA 5240  Cyberlaw: Privacy, Ethics, and Digital Rights  4

Electives and Specialization Courses
Consult faculty advisor for other acceptable courses.
Complete 28 semester hours from the following:  28

Track 1: Network/Communication Security
CS 6710  Wireless Network
EECE 5666  Digital Signal Processing

Track 2: System Security
CS 5600  Computer Systems
or EECE 7352 Computer Architecture
CS 6540  Foundations of Formal Methods and Software Analysis
IA 6120  Software Security Practices

Track 3 Policy/Society
CRIM 7242  Terrorism and International Crime
CRIM 7246  Security Management
CRIM 7252  White-Collar Crime
POLS 7341  Security and Resilience Policy

General Electives
CS 5500  Managing Software Development
CS 6140  Machine Learning
CS 6200  Information Retrieval
EECE 7204  Applied Probability and Stochastic Processes
EECE 7205  Fundamentals of Computer Engineering
EECE 7337  Information Theory
EECE 7339  Testing and Design for Testability
EECE 7350  Software Engineering 1
EECE 7351  Software Engineering 2
EECE 7357  Fault-Tolerant Computers
SOCL 7211  Research Methods
or CS 6350  Empirical Research Methods

Dissertation
Upon achieving PhD Candidacy, complete the following repeatable course two semesters:
IA 9990  Dissertation  4

For the remaining semester(s) complete the following repeatable course: