

# Computer Security & Information Assurance

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## Center of Academic Excellence in Digital Forensics and Cyber Defense Education

Norwich University is one of very few academic institutions to be designated as both a Center of Academic Excellence in Cyber Defense Education (<https://www.nsa.gov/resources/educators/centers-academic-excellence/cyber-defense/>) (since 2001, by the *National Security Agency* of the United States of America) and a Center of Digital Forensics Academic Excellence (<http://www.dc3.mil/>) (since 2012, by the *Defense Cyber Crime Center* of the United States Air Force Office of Special Operations). These designations recognize Norwich's significant contribution in meeting the national demand for digital-forensics and information-assurance education, developing a growing number of professionals with expertise in both areas, and ultimately contributing to the protection of the national critical information infrastructure.

Each student has an individually-assigned faculty adviser from their very first day on campus. The faculty adviser assists in the development of an individualized academic program designed to meet the student's career goals. The student and the faculty adviser work together to keep the student's program on track throughout their enrollment at Norwich. Committed to strong ties linking the classroom, the computer labs, and the real world, this program focuses extensively on the practical application of classroom work to solving real-world problems in forensics and information assurance and emphasis on professionalism and ethics in students' careers.

Instructors in this program utilize extensive real-world experiences when helping students become security professionals. Students learn to consider their fellow-employees as clients whose needs are to be heard and responded to effectively and efficiently.

The Computer Security and Information Assurance (CSIA) major provides a foundation of study in computer programming, digital forensics and information assurance, as well as in the liberal arts, mathematics, management, and the sciences. Students integrate knowledge from these disciplines to enter organizations with both practical, functional capabilities and an enterprise perspective. The curriculum of the major complies with the standards (<http://niatec.info/viewpage.aspx?id=103>) defined by the *Committee on National Security Systems* (CNSS) required by the *National Information Assurance Training and Education Center* (NIATEC). During their sophomore Spring, sophomore CSIA majors must choose at least one of the two available areas of specialization (called *concentrations*) – Forensics or Information Assurance Management (<http://catalog.norwich.edu/residentialprogramscatalog/collegeofprofessionalschools/schoolofbusinessandmanagement/csia/#majorsconcentrationstext>) (students can successfully complete both by taking a few additional courses per semester).

- The Forensics (<http://catalog.norwich.edu/residentialprogramscatalog/collegeofprofessionalschools/schoolofbusinessandmanagement/csia/#majorsconcentrationstext>) Concentration (p. 2) prepares graduates for practical application of current forensics theory, ethics, techniques, skills, and tools for all levels of digital-incident investigation relevant to solving policy violations and crimes. Students learn and apply foundational concepts, terminology and techniques ranging from the extraction and analysis of digital evidence, its sources and

communication, to process-, system- and program-design.

- The Information Assurance (IA) Management Concentration (p. 2) prepares graduates to analyze requirements and implement measures to protect information confidentiality, control, integrity, authenticity, availability, and utility, and to maintain their technical and managerial competence in the face of ever-changing requirements and technology. Students integrate concepts, terminology, and techniques from information assurance, operations management, organizational psychology, and management principles for the effective development, implementation and management of IA in organizations. Students learn always to consider context, mission and organizational priorities when working on information security.

### Goals:

To develop in or provide for students

- Foundational competency in liberal arts, mathematics, management, the sciences, and computer programming;
- An understanding and appreciation for the evolving nature and role of technology at all levels of society;
- An understanding of individual privacy rights and the impact of large-scale data collection and interconnected data sources;
- Multiple, differing perspectives on information security;
- Ethical decision-making principles for deciding how best to implement information assurance in all environments;
- Integrated knowledge and practical skills in digital forensics and information assurance;
- An appreciation for the organizational importance and applications of digital forensics and information assurance;
- Advanced specialization in the theory, practice, and application, of digital forensics or information-assurance management;
- Preparation to participate effectively with computer-security professionals in multiple environments, such as industry, government, military, and academia;
- A multidisciplinary perspective coupled with the commitment to integrate human factors for success in defending information resources; and,
- Readiness for continuing, perpetual education in a constantly changing field.

### Outcomes:

Upon graduation successful students will competently demonstrate:

- Clear and effective communication of the fundamentals of computers, computer science, computer security, and information assurance;
- Facility in at least one programming language and a basic knowledge of at least one other;
- Ability to identify and discuss the fundamental hardware and software architecture of computer systems;
- Application of fundamental theory and practice of digital forensics, digital-incident investigation, and information assurance;
- Professional-level knowledge regarding cyber-law and cyber-crime, including: identifying and classifying cyber-crimes; the motivations of cyber-criminals; seizure and handling of computer-related evidence; admissibility of digital-incident evidence in courts of law; preparing and delivering professional testimony; and the key regulations and laws regarding cyber-crimes of varying types and jurisdictions;

- Ethical, responsible conduct, both personal and professional, in their computer-security and information-assurance practices consistent with the highest professional standards of the field; and
- Depth of knowledge and application of the concepts, terminology and techniques of their chosen concentration area.

### Careers for this Major:

The CSIA curriculum provides a balanced foundation of both information assurance and digital forensics. The Information Assurance Management concentration emphasizes upper-level coursework associated with implementation, management and support of corporate networks, information, and cyber defense programs. The Forensics concentration emphasizes upper-level coursework on the skills, practices and policies of digital forensics and cyber-investigation. Norwich students can specialize in both areas. All organizations need professionals with *either* skill set. However, there is a tendency for IA Management to be more oriented toward careers with for-profit commercial and non-profit public organizations, and for Forensics to be more oriented toward careers with federal, state, and local government agencies. Students' elective course choices further widen the career opportunities open to them. Potential careers include:

- Computer Network Defense
- Counterintelligence
- Counter-Terrorism
- Cyber-Crime Investigation & Analysis
- Cyber-Forensics Investigation
- Cyber-Incident Analysis & Response
- Cyber-Intelligence
- Cyber-Security
- Cyber-Warfare and National Security
- Information Systems/Technology Management
- Malware Analysis
- Penetration Testing
- Threat Analysis
- Law Enforcement (federal, state, tribal, local)
- Legal Studies and Practice of Law as attorneys

### Major & Concentrations

#### Computer Security & Information Assurance (B.S.) – Curriculum Map 2021-2022 Catalog

Students must declare either the Forensics Concentration, the Information Assurance Management Concentration, or both no later than the end of their sophomore year. See requirements below.

Course	Cr. Comp.	Course	Cr. Comp.
<b>FRESHMAN</b>			
<b>Fall</b>		<b>Spring</b>	
CS 100 Foundations of Computer Science and Information Assurance <sup>1</sup>	3	CS 142 Introduction to Python Programming	3
CS 111 Personal & Professional Cyber Safety	1	EN 111 Writing and Inquiry in Academic Contexts	3
EN 110 Writing and Inquiry in Public Contexts	3	General Education History ( <a href="http://catalog.norwich.edu/residentialprograms/catalog/generaleducationgoals/#goal3humanexpressioninliteraturehistoryartshumanitiestext">http://catalog.norwich.edu/residentialprograms/catalog/generaleducationgoals/#goal3humanexpressioninliteraturehistoryartshumanitiestext</a> )	3
MA 107 Precalculus Mathematics <sup>1</sup>	4	General Education Leadership ( <a href="http://catalog.norwich.edu/residentialprograms/catalog/generaleducationgoals/#goal8leadershiptext">http://catalog.norwich.edu/residentialprograms/catalog/generaleducationgoals/#goal8leadershiptext</a> )	1-3
General Education Arts & Humanities ( <a href="http://catalog.norwich.edu/residentialprograms/catalog/generaleducationgoals/#goal3humanexpressioninliteraturehistoryartshumanitiestext">http://catalog.norwich.edu/residentialprograms/catalog/generaleducationgoals/#goal3humanexpressioninliteraturehistoryartshumanitiestext</a> )	3	PY 211 Introduction to Psychology (General Education Social Science)	3
<b>Fall Semester Total Cr.:</b>	<b>14</b>	<b>Spring Semester Total Cr.:</b>	<b>13-15</b>
<b>SOPHOMORE</b>			
<b>Fall</b>		<b>Spring</b>	
CS 140 Programming and Computing <sup>1</sup>	4	CS 228 Introduction to Data Structures	3
IA 241 Cyberlaw and Cybercrime	3	CS 260 Data Communications and Networks	3
MA 240 Introduction to Number Theory and Cryptology (General Education Math)	3	EN 112 Public Speaking	3
MG 341 Business Law I (General Education Ethics)	3	MA 318 Cryptology (General Education Math)	3
Free Elective	3	Free Elective	3
<b>Fall Semester Total Cr.:</b>	<b>16</b>	<b>Spring Semester Total Cr.:</b>	<b>15</b>
<b>JUNIOR</b>			
<b>Fall</b>		<b>Spring</b>	
CS 212 Assembly Language & Reverse Engineering	3	CS 240 Database Management	3
DF 242 Computer Forensics I	4	CS 301 Software Engineering	3
IA 340 Introduction to Information Assurance	3	IA 342 Management of Information Assurance	3

Concentration Elective <sup>1</sup>	3	Concentration Elective <sup>1</sup>	3
Free Elective	3	Concentration Elective <sup>1</sup>	3
<b>Fall Semester Total Cr.:</b>		<b>Spring Semester Total Cr.:</b>	
<b>16</b>		<b>15</b>	
<b>SENIOR</b>			
<b>Fall</b>		<b>Spring</b>	
IA 455 Contemporary Issues in Information Assurance	3	IA 456 Cyber Defense Practicum (Capstone)	3
QM 213 Business and Economic Statistics I or MA 232 Elementary Statistics	3	Concentration Elective <sup>1</sup>	3
Concentration Elective <sup>1</sup>	3	Concentration Elective <sup>1</sup>	3
General Education Literature ( <a href="http://catalog.norwich.edu/residentialprograms/catalog/generaleducationgoals/#goal3humanexpressioninliteraturehistoryartsh">http://catalog.norwich.edu/residentialprograms/catalog/generaleducationgoals/#goal3humanexpressioninliteraturehistoryartsh</a> )	3	Free Elective	3
General Education Lab Science ( <a href="http://catalog.norwich.edu/residentialprograms/catalog/generaleducationgoals/#goal4naturalsciencetext">http://catalog.norwich.edu/residentialprograms/catalog/generaleducationgoals/#goal4naturalsciencetext</a> )	4	General Education Lab Science ( <a href="http://catalog.norwich.edu/residentialprograms/catalog/generaleducationgoals/#goal4naturalsciencetext">http://catalog.norwich.edu/residentialprograms/catalog/generaleducationgoals/#goal4naturalsciencetext</a> )	4
<b>Fall Semester Total Cr.:</b>		<b>Spring Semester Total Cr.:</b>	
<b>16</b>		<b>16</b>	
<b>TOTAL CREDITS FOR THIS MAJOR: 121-123</b>			

<sup>1</sup> Must earn a grade of "C" or higher

<sup>2</sup> Enrollment requires a math placement exam (MPE) score of 2. Students scoring below 2 must successfully complete the appropriate necessary prerequisite math courses first. With a math placement score of 3 a free elective may be substituted for the MA 107 requirement credit hours.

## Concentrations

### Forensics Concentration 2021-2022 Catalog

#### Required Courses

DF 311	Network Forensics	3
DF 312	Malware Forensics	3
DF 411	Cyber Investigation	3
DF 425	Advanced Digital Forensics	3

#### Elective Courses - Choose six (6) non-duplicate credit hours from the following courses:

CS 221	GUI Programming	3
CS 250	Virtual Systems Administration	3
CS 270	Operating Systems & Parallelism	3
CS 280	Intro to Data Science	3
CS 290	Contemporary Data Visualization	3
CS 305	Advanced Data Science	3
CS 315	Intro to Data & Web Mining	3
CS 330	Ethics in Computing and Technology	3
CS 406	Special Topics in Computer Science <sup>1</sup>	1-4
CS 407	Politics of Cyberspace	3
CS 410	Computing Internship <sup>1,2,3</sup>	1-6
CS 437	Machine Learning & Artificial Intelligence	3
IA 360	Network Security	3
MG 309	Management of Organizations	3
MG 346	Business Law II	3
MG 351	Organizational Behavior	3
PY 234	Forensic Psychology	3

**Total Cr. 18**

### Information Assurance Management Concentration 2021-2022 Catalog

#### Required Courses

CS 270	Operating Systems & Parallelism	3
IA 360	Network Security	3
MG 309	Management of Organizations	3

MG 351 Organizational Behavior 3

#### Elective Courses - Choose six (6) non-duplicate credit hours from the following courses:

CS 221	GUI Programming	3
CS 250	Virtual Systems Administration	3
CS 280	Introduction to Data Science	3
CS 290	Contemporary Data Visualization	3
CS 305	Advanced Data Science	3
CS 315	Intro to Data & Web Mining	3
CS 330	Ethics in Computing and Technology	3
CS 406	Special Topics in Computer Science <sup>1</sup>	1-4
CS 407	Politics of Cyberspace	3
CS 410	Computing Internship <sup>1,2,3</sup>	1-6
CS 437	Machine Learning & Artificial Intelligence	3
DF 311	Network Forensics	3
DF 312	Malware Forensics	3
DF 411	Cyber Investigation	3
DF 425	Advanced Digital Forensics	3
MG 346	Business Law II	3
PY 234	Forensic Psychology	3

**Total Cr. 18**

<sup>1</sup> May be taken more than once for credit by approval, contingent on different Topic titles

<sup>2</sup> Maximum 18 credits allowed

<sup>3</sup> Earned internship credit may be applied to not more than two required CS/CSIA major technical/concentration electives