Cyber Defense and Information Assurance (P.S.M.)

About The Program:

As our physical and digital worlds become more deeply interwoven, a web of interdependence is increasingly fading away the distinction between physical and cyberspace infrastructures. One consequence is that citizens are rendered extremely vulnerable to threats against our cyberinfrastructure by cybercriminals who can inflict crippling blows to pockets of society or even the entire nation. With projections that the dearth of a global information security workforce will reach a staggering 1.5 million by 2021, the federal government has expressed its support to meet this urgent need.

In designing the Professional Science Master's (P.S.M.) program in Cyber Defense and Information Assurance (CyberDIA), the dynamic and cross-cutting nature of the current and continuously evolving cyberspace and the barrage of ever-increasing and never-ceasing threats it faces was addressed. The program is designed for aspiring technical professionals at all career levels – entry-level, mid-career, and senior executives – who want to equip themselves with skills necessary to protect their organization and the nation from increasing cyberthreats. The multidisciplinary program design borrows knowledge, skills, and expertise from different academic disciplines, including business, computer and information sciences, electrical and computer engineering, and law. The key focus is on a holistic cybersecurity framework, i.e., one that is built around the core principles of preventive, detective, and corrective security mechanisms. While the CyberDIA curriculum is technology intensive, focusing on network security and digital forensics, it also bridges the ever-increasing gap between cybersecurity technology and cybersecurity policies.

Career Options: Official job placement is not offered, but prospects are excellent given the projected dearth in "Infosec" professionals. Positions include:

- Computer Security Forensic Investigator
- Cybersecurity Systems Engineer
- Information Security Officer
- IT Network Security Penetration Tester
- Security Analyst/Cybersecurity Analyst

Prerequisites for Admission: Prior coursework in Algebra; Pre-Calc; Math Concepts I; Program Design; Data Structures; Architecture, Operating Systems, & Networking; or Computer Theory.

Accreditation: Temple University is fully accredited by the Middle States Commission on Higher Education.

Requirements of Programs:

- **Total Credit Hours**: 30
- **Culminating Events**:
  Capstone Project:

Each student is given a real security problem. Phase 1 relates to compliance: identifying how the security problem affects the organization and which regulations/standards are to be considered. Phase 2 is the technical piece: identifying network and application vulnerabilities; performing forensics (chain of custody); and documenting findings. In Phase 3, all findings from Phases 1 and 2 are presented to the executive body of the affected organization and the faculty mentor(s).

Networking & Operating Systems – This course covers the essentials of operating systems and computer networks. Topics include: the processor, data and program representation, computer memory systems, software system support for I/O including support for networking, and a thorough introduction to the TCP/IP protocol suite. Note: Graduate credit will not apply for CIS MS/PHD programs.

Comp Systems Security & Privacy – Computer systems security and information privacy has become a critical area of computer science development and research. This course involves an analysis of the technical difficulties of producing secure computer information systems that provide guaranteed controlled sharing and privacy. Emphasis is on software modeling and design to better ensure the protection of resources (including data and programs) from accidental or malicious modification, destruction, or disclosure. Current systems and methods will be examined and critiqued. The possible certification of such systems will also be investigated. Note: This is an MS/IST course. No credit for Graduate CS programs.

Introduction to Digital Forensics – This course is a broad introduction to the field of Digital Forensics. It covers various fundamental topics necessary for digital forensics investigation. The course begins with foundations of electronic evidence including cyber-crime laws, the 4th amendment, compliance and requirements, collection and handling, analysis, and reporting. The course also covers fundamentals of file systems with specific details pertaining to Microsoft FAT file systems. Students will learn two important forensics techniques - file recovery and file carving - among other things. Finally, forensics artifacts relevant to Windows Systems and Networks are discussed with relevant lab activities and students are also introduced to Antiforensics. Hands-on lab activities familiarize students with several relevant investigation techniques and the use of open source forensics tools. Students who have completed an equivalent course at Temple or another institution will take an elective as recommended by the program advisor.

Ethical Hacking and Intrusion Forensics – This class will introduce students to the field of hacking with the primary focus being the difference between White-hat Hacking (a.k.a Ethical Hacking) and Black-hat Hacking. The course will enable students to understand how to use hacking techniques to perform a hack within legal confines. The course will focus on both technical and social aspects of security, ranging from cryptography and biometrics to risk mitigation and disaster recovery aspects of organizational security. Of specific focus will be the following broad concepts - Reconnaissance, Scanning, numeration, and Sniffing and Evasion. Based on the ethical concepts built during the first half of the semester, students will learn the process involved with forensics investigations of intrusion attack.

Electives (15 Credits Worth)

Capstone Project – Capstone project for master's students including students in PSM, MA or MS. This class will provide full-time status. Students in PSM programs need to register for at least one credit of

this course to fulfill program requirements. Additional credits may be required for specific programs. This course will confer full-time status at the minimum credit hour registration limit of one credit.

Courses:

Click [HERE](#) for more information on the courses below.

- Comp-Based Appl Prog
- Database Design & Programming
- Networking & Operating Systems
- Programming and Data Structure
- System Software and Operating Systems
- Discrete Structure of Computer Science
- Scripting for Sciences and Business
- Data Structures and Objects
- Operating Systems and Architecture
- IT Process Management
- System Development Processes
- Comp Systems Security & Privacy
- Emerging Technologies
- Knowledge Management
- Seminar in Information Science and Technology
- Software Quality Assurance and Testing
- Software Project Management
- Advanced Database Management Systems
- Usability Engineering
- Network Technologies
- Software Engineering
- Introduction to Digital Forensics
- Advanced Seminar in Information Science and Technology
- Ethical Hacking and Intrusion Forensics
- Audit and Compliance for Security and Digital Forensics
- Programming Techniques
- Operating Systems
- Automata and Formal Languages
- Design and Analysis of Algorithms
- Principles of Data Management
- Data-Intensive and Cloud Computing
- Knowledge Discovery and Data Mining
- Analysis and Modeling of Social and Information Networks
- Neural Computation
- Machine Learning
- Data Warehousing, Filtering and Mining
- Probabilistic Graph Models
- Text Mining and Language Processing
- Computer Vision
- Topics in Computer Science
- Artificial Intelligence
- Computer Networking and Communication
- Energy Management in Data Centers and Beyond
- Security in Cyber-Physical Systems
- Ad Hoc Networks
- Network & Information Security
- Wireless Network and Communication
- Computer Architecture
- Emerging Storage Systems and Technologies
- Distributed Systems
- Seminars in Computer and Information Science
- Seminar in Advanced Topics in Computer Science
- Computer Graphics and Image Processing
- User Interface Design and Systems Integration
- Web Applications Development
- Artificial Intelligence, Heurisitic Models, and Education
- Advanced Topics in Data Base Systems
- Advanced Networks and Client-Server Computing
- Design and Development of E-Commerce Systems
- Distributed and Parallel Computer Systems
- Master's Research Projects
- Preliminary Examination Preparation
- Capstone Project
- Master's Thesis Research