

CYBERSECURITY (MS)

Department website (<https://www.uwp.edu/learn/programs/mscyb.cfm>)

The online M.S. in Cybersecurity program represents a fully online fixed curriculum consisting of 31 credits – five three-credit core courses, four courses in a concentration/track area, a one-credit capstone preparation course and a project-based capstone course. UW-Green Bay, UW-La Crosse, UW-Oshkosh, UW-Parkside, UW-Platteville, UW-River Falls, UW-Stevens Point, UW-Superior offer the program jointly. Graduates of the program will gain the core competencies required to assume a variety of roles across a wide range of industries to include cybersecurity analyst, security consultant, cybersecurity manager, computer system analyst, security application analyst, and information technology specialist. The curriculum was developed in alignment with defined requirements of the Center for National Centers of Academic Excellence in Cyber Defense (CAE-CD) and several established and recognized industry certifications to include the Certified Information Security Manager (CISM), Certified Information Systems Security Professional (CISSP), Certified Ethical Hacker (CEH) and CompTIA Security+ certifications. In addition to courses in key areas such as cybersecurity program planning, security risk, foundational aspects of security, the required capstone course, which represents the culminating experience in the program, will provide students with the opportunity to apply skills acquired from coursework through a project-based experience in their track/concentration area.

Goals of the Program

The degree addresses a recognized high-need area of Cybersecurity as supported by research and input from employers and industry representatives. M.S. in Cybersecurity will predominantly serve adult and nontraditional students who possess a minimum of a completed bachelor's degree, currently work in the field, and have a desire to continue their education toward a master's degree primarily to expand knowledge and specialized skills in cybersecurity. Upon completion of this degree program, students will develop advanced knowledge and skills in both technical and managerial aspects of cybersecurity. Depending on their career goals, students can choose one of the two tracks in the program — Secure Systems Design, Digital Forensics & Security Management — to complete the electives.

Program Learning Outcomes

Students completing the M.S. in Cybersecurity degree will gain the following learning outcomes:

- Describe key principles of cybersecurity
- Analyze network infrastructures and protect them against threats
- Perform security risk analysis for an organization and develop system-specific security programs
- Explain the role of policy, law, and ethics in cybersecurity and ensure compliance with relevant organizational policies and regulatory frameworks
- Forensically investigate and interpret security incidents

Program Learning Outcomes

1. The M.S. in Cybersecurity represents a comprehensive, multidisciplinary curriculum that prepares students to advance their careers and pursue their academic ambitions through leadership and management positions within the cybersecurity field. The program will equip students with the skills needed to effectively

develop, implement and maintain a security strategy within diverse organizations and industry sectors.

Requirements for the Master of Science in Cybersecurity

Code	Title	Credits
Required Core Courses		
CYB 700	Fundamentals of Cybersecurity	3
CYB 701	IT and Operating System Security	3
CYB 703	Network Security	3
CYB 705	Cyber Crime	3
CYB 720	Cybersecurity Ethics & Communication	3
Required Capstone Courses		
CYB 789	Cybersecurity Pre-Capstone	1
CYB 790	Cybersecurity Capstone	3
Completion Options		
In addition to the core and capstone courses listed above, choose one of the concentrations listed below and complete a minimum of 12 credits in the chosen concentration.		12
Total Credits		31

Secure Systems Design Concentration

Code	Title	Credits
Required Courses		
CYB 710	Introduction to Cryptography	3
CYB 770	Security Architecture	3
CYB 775	Advanced Cryptography	3
CYB 780	Software Security	3
Total Credits		12

Digital Forensics & Security Management Concentration

Code	Title	Credits
Required Courses		
CYB 707	Cybersecurity Program Planning	3
CYB 715	IT Security Risk Management	3
CYB 725	Computer Forensics and Investigations	3
CYB 765	Security Program Management	3
Total Credits		12

University Requirements for Master's Degree Programs

To receive a master's degree from UW-Parkside, students must meet the following minimum requirements (note that individual programs may impose more stringent requirements):

1. Complete at least 30 graduate credits, of which no more than 12 may be transferred from another institution.
2. Have an overall GPA of at least 3.00 for all graduate work taken at UW-Parkside that is applicable to the degree program.
3. Satisfy all requirements of the graduate degree program.

Students may take no more than seven years to complete a degree, beginning with the semester in which they complete their first course as a UW-Parkside degree-seeking graduate student, unless they apply for and

receive an extension through the appropriate graduate program. Some programs may impose a shorter time limit. To graduate, students must file a request for graduation. The request form, signed by the student's advisor and filed in the appropriate graduate program office, initiates the final review of the candidate's records. Students also need to apply to graduate with the Office of the Registrar.

Admission to the master of science in cybersecurity program requires:

- Bachelor's degree with, at minimum, a 3.0 undergraduate GPA
- Prerequisite coursework in Introduction to Computer Science, which must include programming content, and prerequisite coursework in Calculus or Statistics, with a minimum grade of C in each course.

CYB 700 | Fundamentals of Cybersecurity | 3 cr

This course introduces fundamental concepts and design principles in cybersecurity. Students will understand what needs protection and why it is essential. Topics include CIA (Confidentiality, Integrity, and Availability), threats, attacks, defense, secure design principles, access control and password management, security policies, critical controls, incident-handling and contingency planning, risk assessment and management.

Prerequisites: Admitted MS-CYB degree seeking students only or program advisor consent on space available basis.

Offered: Yearly.

CYB 701 | IT and Operating System Security | 3 cr

Introduces students to fundamental concepts of modern computing environments and their security implications. Students will explore information technology components including computer hardware, networks, and operating systems while developing practical knowledge of endpoint protection, vulnerability management, and security controls. Emphasis is placed on both technical understanding and security awareness.

Prerequisites: Admitted MS-CYB degree seeking students only or program advisor consent on space available basis.

Offered: Yearly.

CYB 703 | Network Security | 3 cr

Offers the basic knowledge of architectures, cyber threats, vulnerabilities, and defensive techniques for securing networks. The course addresses firewall functionalities, configurations, and managements. Different Architectures of VPNs for securing communication assets are presented with various implementation considerations. Students learn essentials of network analysis tools, monitoring, and policy development.

Prerequisites: Admitted MS-CYB degree seeking students only or program advisor consent on space available basis.

Offered: Yearly.

CYB 705 | Cyber Crime | 3 cr

Explores the landscape of cyberspace, focusing on cyber threats, actors, and attacks. Students will examine privacy issues, legal frameworks, and protective measures at individual, organizational, and governmental levels. Topics include cyber crime, cyber-stalking, and the effectiveness of cybersecurity strategies in preventing digital abuse and criminal activity.

Prerequisites: Admitted MS-CYB degree seeking students only or program advisor consent on space available basis.

Offered: Yearly.

CYB 707 | Cybersecurity Program Planning | 3 cr

Provides instruction on the process used to develop and maintain appropriate security levels for an organization with a focus on implementing a comprehensive security program, a documented set of security policies, procedures, guidelines, and standards. Topics include security planning, strategies, controls, and metrics for measuring effectiveness.

Prerequisites: CYB 700; admitted MS-CYB degree seeking students only or program advisor consent on space available basis.

Offered: Yearly.

CYB 710 | Introduction to Cryptography | 3 cr

Introduces the fundamentals of applied cryptography, including a survey of relevant mathematical concepts and elementary number theory, encryption and decryption, symmetric and asymmetric systems, block ciphers, hash functions, common attacks, digital signatures, key exchange, message authentication, public key cryptography, and implementation of cryptographic systems.

Prerequisites: Admitted MS-CYB degree seeking students only or program advisor consent on space available basis.

Offered: Yearly.

CYB 715 | IT Security Risk Management | 3 cr

Master risk management processes by focusing on risk assessment methodologies to perform comprehensive security risk analyses. Categorize and evaluate technological, individual, and enterprise risks, effectively communicate these risks, and recommend appropriate responses. Understand how risk relates to system security policies to develop system-specific security programs by choosing optimal methodologies.

Prerequisites: Admitted MS-CYB degree seeking students only or program advisor consent on space available basis.

Offered: Yearly.

CYB 720 | Cybersecurity Ethics & Communication | 3 cr

This course is a study of the ways that communication, ethics, and cybersecurity intersect in relation to employment. In addition to ethical frameworks, students will learn to present technical information to audiences with varying goals and technical needs. Presentations and projects will emulate professional scenarios in cybersecurity.

Prerequisites: Prerequisites: Admitted MS-CYB degree seeking students only or program advisor consent on space available basis.

Offered: Yearly.

CYB 725 | Computer Forensics and Investigations | 3 cr

Provides instructions on the investigative and forensics processes of digital evidence with a focus on identifying indicators of compromise, the use of common forensic tools, and the preservation of forensics tools. Topics include forensics iconology, and the analysis of disk, memory, chip-off, mobile device, and OS artifacts.

Prerequisites: CYB 701; admitted MS-CYB degree seeking students only or program advisor consent on space available basis.

Offered: Yearly.

CYB 730 | Computer Criminology | 3 cr

A primer on modern criminology with specific attention to the aspects of technology that facilitate criminal behaviors. Topics include computer crime laws, criminological theories of computer crime, court room and evidentiary procedure, idiographic and nomothetic digital profiling, computer crime victimology, habit/authorship attribution, stylometry, and case linkage analysis.

Prerequisites: Admitted MS-CYB degree seeking students only or program advisor consent on space available basis.

Offered: Yearly.

CYB 735 | Network Forensics | 3 cr

Covers protocol analysis, identification of malicious behavior in systems, and forensic investigations through event log aggregation, correlation and analysis. Students will analyze clips of wired and wireless network protocol analysis to discern methods of attacks and malicious activities.

Prerequisites: CYB 703; admitted MS-CYB degree seeking students only or program advisor consent on space available basis.

Offered: Yearly.

CYB 740 | Incident Response and Remediation | 3 cr

Students will learn about the phases of an incident response system, and the use of IDS and forensics, dealing with false alarms and the remediation process to minimize business impact, plan business continuity, and work with law enforcement, auditors, insurance, and compliance in how to prevent future incidents.

Prerequisites: Admitted MS-CYB degree seeking students only or program advisor consent on space available basis.

Offered: Yearly.

CYB 745 | Secure Operating Systems | 3 cr

Covers operating systems security infrastructure. Topics include, for a given operating system (Windows/Linux), updates and patches, access controls and account management, configuration management, hardening and securing services, and the use of scripting languages to automate security management. Additional topics may include auditing and forensics, virtualization and cloud computing.

Prerequisites: Admitted MS-CYB degree seeking students only or program advisor consent on space available basis.

Offered: Yearly.

CYB 750 | Offensive Security and Threat Management | 3 cr

Covers active defenses such as penetration testing, log management, hacking, threat management and system posturing. Students completing this course will have an understanding of, and the ability to preemptively secure computer and network resources by utilizing information about threats, actors and attack vectors and the ethics behind using this data.

Prerequisites: CYB 700, CYB 703; admitted MS-CYB degree seeking students only or program advisor consent on space available basis.

Offered: Yearly.

CYB 755 | Security Administration | 3 cr

Covers the policy and governance aspects of security. Topics include application of security policies, standards, procedures and guidelines to administration of IT and communications, assessment of compliance including contractual, legal, industry standard, privacy and regulatory requirements, and implementation of security audits and assessment of security performance and security policy-efficacy.

Prerequisites: Admitted MS-CYB degree seeking students only or program advisor consent on space available basis.

Offered: Yearly.

CYB 760 | Cybersecurity Leadership and Team Dynamics | 3 cr

Focuses on leadership best practices and the interpersonal processes and structural characteristics that influence the effectiveness of teams. Emphasis will be placed on leadership models, principles of team building, group dynamics, problem solving, and crisis management in cybersecurity issues. Course will include case studies of modern security incidents.

Prerequisites: Admitted MS-CYB degree seeking students only or program advisor consent on space available basis.

Offered: Yearly.

CYB 765 | Security Program Management | 3 cr

Introduces cybersecurity program management and compliance.

Students will explore the development, implementation, and evaluation of security programs taking relevant legal and regulatory requirements into account. Topics include security policies, incident response, federal regulations, and emerging security challenges in today's digital landscape.

Prerequisites: CYB 700; admitted MS-CYB degree seeking students only or program advisor consent on space available basis.

Offered: Yearly.

CYB 770 | Security Architecture | 3 cr

Focuses on security architectures for the protection of information systems and data. Master identifying the potential vulnerabilities in system architectures and design robust, secure architectures tailored to specific applications. Topics include common enterprise and security architectures, secure cloud computing, virtualization platforms, and the application of industry standards like the Zero Trust model.

Prerequisites: CYB 703; admitted MS-CYB degree seeking students only or program advisor consent on space available basis.

Offered: Yearly.

CYB 775 | Advanced Cryptography | 3 cr

An in-depth study of modern cryptography. Topics include public key and private key cryptography, identity-base cryptography, types of attacks, key management, perfect secrecy, hashing, digital signatures, virtual private networks, and quantum key cryptography. Topics from number theory and discrete probability and statistics necessary for understanding current cryptosystems and their security will be covered.

Prerequisites: CYB 710; admitted MS-CYB degree seeking students only or program advisor consent on space available basis.

Offered: Yearly.

CYB 780 | Software Security | 3 cr

Emphasizes both proactive and reactive measures and systematic evaluation techniques for identifying and mitigating vulnerabilities and potential flaws in software systems that could be exploited by malicious actors. The unit focuses on the examination of software structure and behavior, either by directly reviewing code or observing its execution in controlled environments such that vulnerabilities are caught early in the development lifecycle or during regular security assessments. The objective is to integrate security into the entire software development process, minimizing risks and enhancing the overall resilience of software systems against cyber threats.

Prerequisites: Admitted MS-CYB degree seeking students only or program advisor consent on space available basis.

Offered: Yearly.

CYB 785 | Cyber Physical System Security | 3 cr

Covers the fundamentals and techniques to design and implement cyber-physical systems. Topics include the architecture of cyber-physical systems, exploiting software vulnerabilities, secure coding, microservices security, cloud services security, reverse engineering, security assessment of cyber-physical systems, and data analytics for security.

Prerequisites: CYB 775; admitted MS-CYB degree seeking students only or program advisor consent on space available basis.

Offered: Yearly.

CYB 789 | Cybersecurity Pre-Capstone | 1 cr

Prepares student for the capstone experience. Drawing on skills learned, students will submit a written project proposal – with organization, timeline, learning objectives, and specific deliverables identified –for faculty approval. This course is a prerequisite for the capstone course.

Prerequisites: CYB 700, CYB 701, CYB 703, CYB 705, and CYB 720; admitted MS-CYB degree seeking students only or program advisor consent on space available basis.

Offered: Yearly.

CYB 790 | Cybersecurity Capstone | 3 cr

Students present the project identified in the Cybersecurity Pre-Capstone course and submit a written report plus an oral presentation to both faculty and the host organization. Students will be assessed on the clarity and content of the written report and presentation. Host evaluation will account for a significant percentage of students' final grades.

Prerequisites: CYB 789; admitted MS-CYB degree seeking students only or program advisor consent on space available basis.

Offered: Yearly.