

# MATHEMATICS AND COMPUTER SCIENCE

## Mission Statement

UW-Superior's Mathematics and Computer Science Department (<https://www.uwsuper.edu/academics/academic-departments/mathematics-and-computer-science/>) provides majors and minors in Computer Science (<http://catalog.uwsuper.edu/undergraduate/academic-departments/mathematics-computer-science/computer-science/>), Mathematics (<http://catalog.uwsuper.edu/undergraduate/academic-departments/mathematics-computer-science/mathematics/>), and Mathematics Education (<http://catalog.uwsuper.edu/undergraduate/academic-departments/mathematics-computer-science/mathematics/>). The programs provide a core of fundamental courses along with an array of electives that enable students to pursue special interests. Using this versatile, highly regarded program, students can choose a major, minor, certification or associates degree that prepares them for a career or graduate study in Computer Science, Mathematics, Information Technology and Systems, Engineering or Mathematics Education.

## Faculty and Staff

Bezroukov, Serguei - Professor  
 Glesener, Kristopher - Senior Lecturer  
 Gu, Xiaofeng - Assistant Professor  
 Kahler, Heather - Senior Lecturer  
 Khorroosi, Hossain - Sr Lecturer, Mathematics  
 Leck, Uwe - Associate Professor  
 Lynch, Shaun - Professor, Info Technology  
 Lynch, Patser - Academic Department Associate  
 Rosenberg, Steven - Associate Professor  
 Scott, Chad - Professor and Department Chair  
 Toscano, Marilyn - Senior Lecturer  
 Tucker, Shin-Ping - Associate Professor

## Degrees

- Cybersecurity (<http://catalog.uwsuper.edu/graduate/academic-departments/mathematics-computer-science/cybersecurity/>)
- Information Technology Management (<http://catalog.uwsuper.edu/graduate/academic-departments/mathematics-computer-science/information-technology-management/>)

## Course Descriptions

### Computer Science

#### CSCI 681 Special Topics 1.00-4.00

Graduate level investigation of one or more topics of current interest. Not intended for independent study projects. May be repeated, but no more than a total of eight credits may be earned from both MATH 681 and CSCI 681.

#### Typically Offered:

- Occasional by Demand

#### CSCI 490 Computer Science Capstone Internship 1.00-4.00

Students work in an approved position to gain experience in solving real problems using computer science, write a report, and present the results to the entire department. Students may receive salaried appointments with cooperating companies. Taken during senior year.

#### Prerequisites:

Enrollment in CSCI 490 - must be enrolled in the Computer Science Major and Department consent

#### Typically Offered:

- On-campus: Select Semesters
- Online: Select Semesters

#### CSCI 690 Computer Science Capstone Internship 1.00-4.00

Students work in an approved position to gain experience in solving real problems using computer science, write a report, and present the results to the entire department. Students may receive salaried appointments with cooperating companies. Taken during senior year.

#### Typically Offered:

- On-campus: Select Semesters
- Online: Select Semesters

## Cybersecurity

#### CYB 700 Cybersecurity Fundamentals 3.00

Introduces fundamental concepts and design principles in cybersecurity. Students will understand what, why, and how to protect in the cyberworld. Topics include CIA (Confidentiality, Integrity, and Availability), threats, attacks, defense, least privilege, access control and password management, security policies, critical controls, incident-handling and contingency planning, risk assessment and management.

#### Typically Offered:

- Fall, Spring, and Summer Terms

#### CYB 703 Network Security 3.00

Examines network architectures, threats and attack surfaces exploited by these threats. Students will look at network traffic inspection, common attacks and defensive techniques like encryption, network segmentation, firewalls, application proxies, honeypots, DMZs, monitoring networks using: intrusion detection and intrusion prevention systems, and network access control.

#### Typically Offered:

- Fall, Spring, and Summer Terms

#### CYB 705 Cybersecurity and Society 3.00

Presents the principles of applied sociology that account for the human factors in security systems. Topics include an examination of the human role in cybersecurity, the role of security in the context of an organization, and a special focus on the development and implementation of cybersecurity policies.

#### Typically Offered:

- Fall, Spring, and Summer Terms

**CYB 707 Cybersecurity Planning 3.00**

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 the effectiveness.

**Prerequisites:**

CYB 700 prerequisite

**Typically Offered:**

- Fall, Spring, and Summer Terms

**CYB 710 Introductory Cryptography 3.00**

Fundamentals of applied cryptography, including encryption and decryption, symmetric and asymmetric systems, pseudorandom functions, block ciphers, hash functions, common attacks, digital signatures, key exchange, message authentication and public key cryptography. Implementation of cryptographic systems in an approved programming language. Survey of relevant mathematical concepts, including elementary number theory.

**Typically Offered:**

- Fall, Spring, and Summer Terms

**CYB 715 Managing Security Risk 3.00**

Covers risk management processes and tools, risk assessment and analysis models, economic and control implications, risk measurement, and the ethics of risk. Students will communicate the technical and management aspects of risk, based on research of their chosen industry, related regulation, recent industry reports, and risk implications to organizations, individuals and the nation.

**Typically Offered:**

- Fall, Spring, and Summer Terms

**CYB 720 Communication in Cybersecurity 3.00**

Research, organize, and present technical information to audiences with varying goals and technical needs. Emphasis on ethics, critical thinking, listening skills, and feedback to develop effective messages utilizing verbal and nonverbal communication strategies and visual aids. Individual and group presentations and projects will emulate professional scenarios in cybersecurity.

**Typically Offered:**

- Fall, Spring, and Summer Terms

**CYB 725 Computer Forensics 3.00**

This course provides instruction on the investigative and forensics processes of digital evidence with a focus on identifying indicators of compromise, the use of common forensics 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:**

Successful completion of CYB 700, 703

**Typically Offered:**

- Fall, Spring, and Summer Terms

**CYB 730 Computer Criminology 3.00**

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.

**Typically Offered:**

- Fall, Spring, and Summer Terms

**CYB 735 Network Forensics 3.00**

Covers protocol analysis, identification of malicious behavior in systems, and forensic investigations through event log aggregation, correlation and analysis. Students will analyze clips of network protocol analysis to discern methods of attacks and malicious activities. Reviews wired and wireless protocols and cover their associated attacks, with case studies involving protocol analysis, log analysis, and other tools.

**Prerequisites:**

Successful completion of CYB 703

**Typically Offered:**

- Fall, Spring, and Summer Terms

**CYB 740 Incident Response and Remediation 3.00**

Addresses how to set up an incident response system in an organization and the phases of an IR: Preparation, Identification, Notification, Containment, and Eradication of the threat actors, and Recovery and Reporting to prevent future incidents. Students will learn about 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.

**Prerequisites:**

Successful completion of CYB 700, 703, 705, 707, 715, 720

**Typically Offered:**

- Fall, Spring, and Summer Terms

**CYB 745 Secure Operating Systems 3.00**

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.

**Typically Offered:**

- Fall, Spring, and Summer Terms

**CYB 750 Offensive Security 3.00**

This course includes 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:**

Successful completion of CYB 700, 703

**Typically Offered:**

- Fall, Spring, and Summer Terms

**CYB 755 Security Administration 3.00**

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:**

Successful completion of CYB 700, 703, 705, 707, 715, 720

**Typically Offered:**

- Fall, Spring, and Summer Terms

**CYB 760 Leadership & Teams 3.00**

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.

**Typically Offered:**

- Fall, Spring, and Summer Terms

**CYB 765 Cybersecurity Management 3.00**

Covers management of cybersecurity policies and strategies at the organizational, national, and transnational levels. Examines the implications of key domestic and international regulations and changes in information technology and communications on security operations. Includes development of organizational security preparation, processes, and responses, and developing a disaster recovery program.

**Prerequisites:**

Successful completion of CYB 700, 703, 705, 707, 715, 720

**Typically Offered:**

- Fall, Spring, and Summer Terms

**CYB 770 Security Architecture 3.00**

Focuses on security architectures for the protection of information systems and data. Students completing this course can identify potential vulnerabilities in system architectures and design secure architectures. Topics include common enterprise and security architectures and their key design elements, such as secure cloud computing and virtualization infrastructures.

**Prerequisites:**

Successful completion of CYB 703

**Typically Offered:**

- Fall, Spring, and Summer Terms

**CYB 775 Applied Cryptography 3.00**

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

**Prerequisites:**

Successful completion of CYB 710

**Typically Offered:**

- Fall, Spring, and Summer Terms

**CYB 780 Software Security 3.00**

Covers the foundations of engineering secure applications, including techniques used to engineer secure software and assess the security of applications. Topics include exploiting web vulnerabilities, secure development processes, implementing security features such as secure data storage and transmission, threat modeling, security requirements, code analysis, and penetration testing.

**Typically Offered:**

- Fall, Spring, and Summer Terms

**CYB 785 Cyber-Physical Sys. Security 3.00**

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:**

Successful completion of CYB 775

**Typically Offered:**

- Fall, Spring, and Summer Terms

**CYB 789 Cybersecurity Pre-capstone 1.00**

Prepares student for capstone experience. Draws 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 pre-requisite for the capstone course.

**Prerequisites:**

Completion of CORE courses CYB 700, 703, 705, 707, 710, 715, 720, 725, 730, 740, 745, 750, 755, 760, 765, 770, 775, 780, 785

**Typically Offered:**

- Fall, Spring, and Summer Terms

**CYB 790 Cybersecurity Capstone 3.00**

Students present project identified in Capstone Preparation and submit a written report plus oral presentation to both faculty and host organization. Students will be assessed on clarity and content of written report and presentation.

**Prerequisites:**

Successful completion of CYB 789

**Typically Offered:**

- Fall, Spring, and Summer Terms

**Information Technology Management****ITM 700 Communications for IT Professionals 3.00**

This course focuses on developing organizational communication skills for IT professionals. Topics include crucial conversations, evidence-based decision making, and change management strategies for organizational transformation. This course also emphasizes the development of organizational and interpersonal communication skills relating to cultural sensitivity, diversity, and ethical issues in the IT field.

**Typically Offered:**

- Fall, Spring, and Summer Terms

**ITM 705 Leading the IT Function 3.00**

Focusing on the application of management and leadership theories, students will explore their own personal assets and liabilities to become an effective leader and change agent in a complex adaptive system. Students will be introduced to strategic planning processes, as well as IT governance and ethical considerations.

**Typically Offered:**

- Fall, Spring, and Summer Terms

**ITM 710 Finance for IT Managers 3.00**

Frame financial decisions within general and project accounting principles. Topics include; pro forma financial statements, time value of money, cash flows and equivalence, depreciation, net present value, rate of return, and ratio analysis. Prepare budgets that prioritize projects within constraints, address uncertainty and intangibles, and integrate with project scheduling.

**Typically Offered:**

- Fall, Spring, and Summer Terms

**ITM 715 Data Science 3.00**

Addresses issues for developing, managing and supporting data-driven decision-making in the organization. Topics include data analytics, data warehousing, machine learning, and artificial intelligence, as well as the ethical collection, use and application of data.

**Typically Offered:**

- Fall, Spring, and Summer Terms

**ITM 720 Cloud Computing and Enterprise Applications 3.00**

Leverage cloud services to streamline computing resources, deploy enterprise applications, improve user access and system reliability, and utilize advanced computing capabilities. Discuss implementation of innovative technologies. Examines the services available, along with deployment strategies, evaluation criteria, economic justification, and manageability.

**Typically Offered:**

- Fall, Spring, and Summer Terms

**ITM 725 Enterprise Security 3.00**

Explores technical, administrative, ethical and physical aspects of IT security. Investigates various threats within IT and fraud. Applied information classification to the design of information, network and physical security. Evaluates the business processes of risk, business continuity, audit, and the risk within software development.

**Typically Offered:**

- Fall, Spring, and Summer Terms

**ITM 730 Agile and Traditional IT Project Management 3.00**

Examines project management concepts as applied to IT projects; covers traditional PMBOK techniques such as project identification, selection, procurement, and cost /schedule preparation and monitoring. Introduces agile IT project management concepts including Scrum and Extreme Programming. Requires students to apply these concepts to group projects.

**Typically Offered:**

- Fall, Spring, and Summer Terms

**ITM 735 Business Analysis and System Development 3.00**

This course focuses on the importance, role, and techniques of the business analysis function in the modern IT organization. This course is organized around the six knowledge areas and associated techniques of the Business Analysis Body of Knowledge (BABOK) specified by the International Institute of Business Analysis.

**Typically Offered:**

- Fall, Spring, and Summer Terms

**ITM 740 IT Operations 3.00**

This course explores best practices and techniques for managing IT infrastructure and operational environments in support of the organization's strategic goals in the development and deployment of applications and services. Coverage includes network infrastructure; servers and devices; computer operations; service management; facilities; help desk services, DevOps, process automation and governance frameworks.

**Typically Offered:**

- Fall, Spring, and Summer Terms

**ITM 745 IT Governance, Ethics, and Regulatory Compliance 3.00**

This course examines best practices in IT governance to achieve regulatory compliance, optimize use of available resources, ensure trustworthiness of enterprise information, and support business strategies and objectives. Topics include: strategic alignment, IT service and control frameworks, portfolio management, IT risk management, and ethical issues in IT governance.

**Prerequisites:**

Admission to the MS Information Technology Management program and ITM 735

**Typically Offered:**

- Fall, Spring, and Summer Terms

**ITM 750 Evaluation of Emerging Technologies 3.00**

This seminar course researches, identifies and evaluates significant new trends, technologies and events influencing the global environment of information technology and systems. The course will evaluate future and disruptive technologies, strategies for successful implementation of innovative technologies, critical thinking, and ethics pertaining to its use

**Prerequisites:**

Admission to the MS Information Technology Management program and ITM 740.

**Typically Offered:**

- Fall, Spring, and Summer Terms

**ITM 754 Capstone Preparation 1.00**

Students select their capstone project, create a plan, define deliverables, secure approval and complete setup of their development environment. Students review concepts necessary for completion of the capstone including Agile project management, systems analysis and communicating with technical and non-technical audiences. Additional topics may be included.

**Prerequisites:**

Prerequisite for enrolling in ITM 754 Capstone is completion of ITM 730 or co-enrollment with ITM 730; available after completing 21 credits

**Typically Offered:**

- Fall, Spring, and Summer Terms

**ITM 755 Capstone 3.00**

In this course, students complete the projects approved in the Capstone Preparation course. This course includes the management, development and delivery of an information technology project to a client or employer, including regular communication of status to both technical and non-technical audiences

**Prerequisites:**

Admission to the MS Information Technology Management program and ITM 754

**Typically Offered:**

- Fall, Spring, and Summer Terms

## Mathematics

**MATH 681 Special Topics 1.00-4.00**

In-depth study of specialized current topics in mathematical sciences. May be repeated when topics are different.

**Typically Offered:**

- Occasional by Demand

## Contact Information

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