

CS 572 **Computability and Computational Complexity** 4 Cr.
 Emphasis on the limits to the power of computation and a systematic analysis of the algorithms that harness it. Computability topics include the Chomsky hierarchy, several automata and language models, and demonstrations of incomputable problems. Complexity topics include various design strategies such as greedy, divide and conquer, and backtracking, and fundamental computing algorithms, such as searching, sorting, graphs, trees, pattern matching, and computational geometry, with a short foray into distributed algorithms.

CS 593 **Seminar in Professional Practices** 2 Cr.
 (Also offered as IT 593.) Student and faculty presentations in the context of professionalism and ethical responsibilities in software development and human-computer interaction. Topics include laws, risks, and liabilities, codes of ethics, privacy, international- and gender-related issues, philosophical frameworks, and economic implications. Students will learn and develop oral presentation and research skills.

Cyber Security

CYB 520 **Operating Systems** 2 Cr.
 This course is an introduction to the concepts of modern operating systems. Topics include processes, scheduling, synchronization, virtual memory, file systems, shells, and security. Lab topics include common operating system utilities and commands as well as programming to use OS facilities.

CYB 540 **Assembly Language Programming** 2 Cr.
 Students explore fundamentals of the structure of digital computers and an introduction to assembly language programming. Topics include machine instructions, data representation, addressing techniques, and program segmentation and linkage. Prerequisite: IT 500.

CYB 530 **Securing and Administering Systems in Windows Environment** 3 Cr.
 This course focuses on overall security processes with particular emphasis on security policy enforcement and compliance in Microsoft Windows environments. This course also provides a survey of security technologies, products, and solutions. Hands-on skill labs focus on Windows group policy, Windows networking security, and security architecture of Windows systems. Windows server and client administration is also discussed.

CYB 532 **Securing and Administering Systems in Linux Environment** 3 Cr.
 This course discusses the secure administration of Linux server and client systems. The course will focus on security strategies in implementing Linux systems. Hands-on skill labs focus on Linux firewall design, the installation, configuration, and maintenance of Linux server environments. This course also examines common vulnerabilities and other security issues in Linux operating systems.

CYB 542 **Theory and Practice of Cryptography** 3 Cr.
 The course approaches the fundamental principles of cryptography and network security from both theoretical and applied aspects. It considers classical goals of cryptography such as privacy, authenticity, and integrity. Topics include stream and block ciphers, symmetric and asymmetric encryption schemes, message authentication codes, public key encryption, and digital signatures. Additional topics include number theory, traffic analysis, and crypto-attacks.

CYB 552 **Reverse Software Engineering** 3 Cr.
 This course is an introduction to the art of determining what a piece of software does and how it works without access to the source code. Students will learn the use of tools that assist in this process including assembler and machine language.

CYB 572 **IT Audit, Monitoring, and Testing** 3 Cr.
 This course develops the skills of IT auditing, monitoring, and testing within an organization. Student will prepare audits of technology resources as required by several government regulations. This course utilizes approaches from several IT governance frameworks.

CYB 582 **Networking Infrastructure Security** 3 Cr.
 This course introduces the fundamentals of digital network systems and the security issues associated with them. Topics include analysis of switching and routing protocols, OSI, TCP/IP, traffic analysis, network security management, client-server models, DNS and DHCP attacks, web servers and web security, and LAN security.

CYB 590	Topics in Cyber Security Study of special and timely topics in cyber security. May be repeated more than once when topics differ. Prerequisite might be set by instructor.	1-3 Cr.
CYB 642	Cyber Forensics This course introduces the processes of performing cybercrime investigations. It provides students with both the theoretical and practical foundation on techniques and methods used for extraction of information from digital devices. Students will be exposed to developing and using various computer forensics tools to be used in the cyber forensics process. Both Windows and Unix systems will be used to illustrate typical investigative process.	3 Cr.
CYB 652	Cyber Warfare Cyberspace has become a new battle space equally important with the land, sea, and air. This course will focus on the exploration of what cyberspace is and the role that it plays in both civilian life and military operations. It discusses the technical, tactical, and operational issues from both defensive and offensive sides. This course will also address the emerging policy and regulations, doctrine, and strategy of conducting cyber warfare at the national level. Students will be exposed to the development and use of operational systems and concepts.	3 Cr.
CYB 662	Wireless Security This course introduces system security issues in wireless networks such as wireless local area networks, satellite communications, cellular networks, and wireless personal area networks (Bluetooth, Zigbee, and RFID). Topics include availability, integrity, confidentiality, control of fraudulent usage of networks, jamming, and interception. It teaches students how to develop attacks for wireless networks and appropriate defense mechanisms for them.	3 Cr.
CYB 672	Secure Software Development This course introduces a process for designing secure applications that can withstand attacks. The course also discusses security testing and auditing. It focuses on the security issues a developer faces and common security vulnerabilities and flaws. The course explains security principles, strategies, coding techniques, and tools that can help make code more resistant to attacks. Students will write and analyze code that demonstrates specific secure development techniques.	3 Cr.
CYB 673	CISSP This course is designed to prepare students to sit for the CISSP the exam. This course is an accelerated review course and assumes students have a basic understanding of networks and operating systems. The course will focus on the ten domains of knowledge as determined by (ISC)2.	1 Cr.
CYB 686	Internship A supervised work experience in cyber security firm or a cyber security related position. May be repeated. No more than 4 credits of CYB 686 may be applied toward the degree. Prerequisite: CYB 689 and approval by the program director and/or dean of the Graduate School.	1-3 Cr.
CYB 689	Professional and Career Development Encourages students to reflect upon their career goals, strengths, and challenges as they plan their entry into the job market, and to develop successful skills and strategies for a job search. Includes resume and cover letter preparation, networking, interviewing, approaching referees, and other topics relevant to preparation for career advancement, including further graduate study. S/U grade only.	0-1 Cr.
CYB 690	Advanced Topics in Cyber Security Study of special advanced topics in cyber security. May be repeated more than once when topics differ. Prerequisite: 9 credits of CYB course work.	1-3 Cr.
CYB 692	Research Project Research on a topic of special interest to the student under the supervision of a faculty adviser. Major paper or evidence of project completion is required. Prerequisite: 9 credits of CYB coursework and the project must be approved prior to registration. No more than 6 credits of CYB 692 and CYB 695 may be applied toward the degree.	1-3 Cr.
CYB 695	Independent Study Investigation of cyber security topics under a faculty supervisor. Requires a research or concluding paper, or evidence of project completion. Prerequisite: 9 credits of CYB coursework and the project must be approved prior to registration. No more than 6 credits of CYB 692 and CYB 695 may be applied toward the degree.	1-3 Cr.