TECHNOLOGY, CYBERSECURITY & POLICY (CYBR)

Courses

CYBR 4320 (3) Cybersecurity Network Analytics

This Cybersecurity Network Analytics course takes a hands-on approach to detecting malicious activity within network traffic. The course will first introduce methodologies for analyzing cyber data. This knowledge will then be used practically, as the students will be given the chance to test out approaches on real traffic. At the conclusion, students will have both a theoretical understanding of cyber algorithms and their use in a real-world setting.

Equivalent - Duplicate Degree Credit Not Granted: CYBR 5320

Requisites: Requires prerequisite course of CYBR 3300 or CSCI 3403 (minimum grade C-).

Recommended: Prerequisite C++ and Linux/Unix experience and knowledge of computer networking.

CYBR 5000 (3) Seminar in Technology, Cybersecurity and Policy

Introduces students to major topics and research at the interface of technology, cybersecurity, and policy by providing a weekly series of guest lectures with questions and discussion. These lectures will be followed by related readings, class discussions, and group work, which show the relationship of cybersecurity and new technology to policy.

CYBR 5010 (3) Fundamentals of Data Communication

Combining conceptual knowledge about data communications and core Internet technologies with hands-on labs that reinforce the conceptual knowledge, this course provides students with the ability to create innovative technology solutions in their discipline. Learning how the Internet works and being able to evaluate and operate an Internet network is a valuable skill; students in this course will have a competitive advantage in this foundational field.

Equivalent - Duplicate Degree Credit Not Granted: CSCI 5010

Requisites: Restricted to Technology, Cybersecurity and Policy MS Majors and Business Analytics MS Majors.

CYBR 5020 (3) Fundamentals of Network Programming

This course provides an immersion into the foundation theories of network programming and software development for emerging technologies. Students will gain direct experience with real-world programming lab experiments and demonstrations that will relate to the prolific increase of cross-discipline programming.

Equivalent - Duplicate Degree Credit Not Granted: CSCI 5020

Requisites: Restricted to Technology, Cybersecurity and Policy MS Majors.

CYBR 5030 (3) Fundamentals of System Administration and Virtualization

Introduces the basic use and administration of Unix and Linux systems. Topics include booting and system management, scripting, storage and logical volume management, filesystem configuration, account management and password security, process control, software installation, event logging and system auditing. Students will also develop familiarity with virtualization platforms such as VirtualBox and VMware to implement and test their system configurations.

Equivalent - Duplicate Degree Credit Not Granted: CSCI 5030

Requisites: Restricted to Technology, Cybersecurity and Policy MS Majors.

CYBR 5113 (3) Linux System Administration

Introduces Linux system administration and related topics. Includes hardware and software installation, storage management, configuration of user accounts and system services, development of automation and monitoring tools, and the provisioning of common network services. This laboratory focused course will provide significant exposure to the network security concerns of Internet connected hosts. Students will build a network of Linux servers from the ground up, using provided computing resources, and must maintain and secure these servers themselves. Previously offered as a special topics course.

Equivalent - Duplicate Degree Credit Not Granted: CSCI 5113 and CSCI 4113

Requisites: Restricted to Technology, Cybersecurity and Policy (CYBR) graduate students only.

Recommended: Prerequisite CSCI 3753 (minimum grade B).

CYBR 5200 (3) Introduction to Wireless Systems

Overviews the distinctive characteristics of the wireless communications medium. Topics covered include: Analog signals, Antennas and Propagation, Digital Signals, Sampling, Quadrature Signals, Digital Modulation, SNR and SINR Concepts, Channel Models, Channel Statistics, and Link Budgets. The course includes an introduction to MIMO and beam-forming as implemented in modern communication systems. Software Defined Radio (SDR) is introduced to facilitate student hands-on learning of radio operation. Previously offered as a special topics course.

Equivalent - Duplicate Degree Credit Not Granted: CSCI 5200 and CSCI 4200

Recommended: Prerequisites CYBR 5010 and CYBR 5012.

CYBR 5220 (3) Wireless Local Area Networks

Emphasis on the IEEE P802.11 family of WLAN standards. Students learn the legacy versions of the standard (802.11DS/b), the current generation of WLAN systems (802.11a/g/n/ac), and will to analyze and critique upcoming versions (802.11ax/ba), and gain insight into proposals for new research in WLAN. Exposure to the interoperability and certification process for WLAN by the Wi-Fi Alliance, study the newest Wi-Fi Certified¿ programs, and will learn how to model and analyze WLAN traffic using industry standard tools.

Equivalent - Duplicate Degree Credit Not Granted: CSCI 5220 and ECEN 5122

Requisites: Requires prerequisite course of CYBR 5010 or CSCI 5010 or CSCI 5273 (minimum grade B).

Recommended: Prerequisite CYBR 5200 or CSCI 5220.

CYBR 5230 (3) Wireless Systems Lab

This Wireless Solutions Architecture course is designed to examine the core concepts of wireless architecture, design and implementation. The course will focus on architecting solutions unlicensed technology, specifically enterprise Wi-Fi networks. Students will learn how to design, implement, troubleshoot and operate enterprise wireless networks.

Equivalent - Duplicate Degree Credit Not Granted: CSCI 5230

Requisites: Requires prerequisite course of CYBR 5200 (minimum grade B).

Recommended: Prerequisite CYBR 5010.

CYBR 5240 (3) Introduction to Blockchain
Examines an emerging technology known as blockchain. Blockchain refers to the distributed and decentralized database technology behind popular cryptocurrencies such as Bitcoin and Ethereum. However, it can be used to record and transfer any digital asset, not just currency. This course explores the fundamentals of blockchain technology and its application from three key perspectives: policy and governance, technology, and application. Students gain an understanding of key concepts and how to apply them in the industry. Previously offered as a special topics course.
Equivalent - Duplicate Degree Credit Not Granted: CSCI 5240 and CSCI 4240
Requisites: Restricted to graduate students only.

CYBR 5250 (2-4) Technology Law and Policy Clinic
Features technology law advocacy before administrative, legislative and judicial bodies in the public interest. Formerly TLEN 5250. Instructor consent required.
Equivalent - Duplicate Degree Credit Not Granted: LAWS 7809
Requisites: Restricted to CYBR/TLEN graduate students.
Grading Basis: Letter Grade

CYBR 5260 (3) Seminar: Law and Economics of the Information Age
Examines basic regulatory and legal challenges of our information economy and digital age. Emphasizes the "networked" information industries, the proper role of "unbundling" policies to advance competition and how intellectual property and antitrust rules should be developed. Formerly TLEN 5260.
Equivalent - Duplicate Degree Credit Not Granted: LAWS 8341
Requisites: Restricted to CYBR/TLEN graduate students.

CYBR 5300 (3) Cybersecurity
Introduces core concepts in cybersecurity including confidentiality, integrity, authentication, risk management, and adversarial thinking. The concepts will be applied to both traditional information technology (IT) systems and cyber physical systems (CPS). The course provides a cyber security foundation that will allow practitioners in other fields apply to understand cyber security trade-offs and will also provide interested students with a basis further study in cyber security. At the conclusion of the course, students should have a solid foundation in cybersecurity and hands-on experience.
Equivalent - Duplicate Degree Credit Not Granted: CSCI 5403
Requisites: Restricted to graduate students only.
Recommended: for graduate students only.

CYBR 5303 (1) Cybersecurity Club Companion Course
Gives students hands-on experience applying practical security skills and adversarial thinking to real-world problems. Students will work in small teams on internal challenges, lab development, open source contributions, and will represent the university in larger teams for external challenges at the national and global level, such as those hosted by Collegiate Cyber Defense Competition (CCDC), Wicked6, DOE CyberForce, etc. Students will be expected to participate in both internal and external challenges, attend meetings, and present short presentations to the group when appropriate. Previously offered as a special topics course.
Equivalent - Duplicate Degree Credit Not Granted: CSCI 5303 and CSCI 4303
Repeatable: Repeatable for up to 3.00 total credit hours.
Recommended: Prerequisites CYBR 5300 or CSCI 5403 or CSCI 3403.

CYBR 5320 (3) Cybersecurity Network Analytics
This Cybersecurity Network Analytics course takes a hands-on approach to detecting malicious activity within network traffic. The course will first introduce methodologies for analyzing cyber data. This knowledge will then be used practically, as the students will be given the chance to test out approaches on real traffic. At the conclusion, students will have both a theoretical understanding of cyber algorithms and their use in a real-world setting.
Equivalent - Duplicate Degree Credit Not Granted: CYBR 4320
Requisites: Requires prerequisite courses CYBR 5300 or CSCI 3403 or CSCI 5403 or MSBX 5480 (minimum grade B).
Recommended: Requisite C++ and Linux/Unix experience and knowledge of computer networking.

CYBR 5330 (3) Digital Forensics
Learn how to identify, collect, examine, analyze, and present digital evidence and the legal challenges associated with conducting digital forensics investigations. Explore various file system types and structures. Learn how to recovery and extract potential evidence from deleted files and directories. Learn how to capture and profile data residing in live memory. Analyze running processes and recover memory artifacts. Learn about various methods data can be hidden on a computing devices, storage media, and within covert communications channels.
Recommended: Prerequisites CYBR 5300 or CSCI 3403 or CSCI 5403.

CYBR 5340 (3) VOIP Network Design
Focuses on VoIP network design and optimization. The emphasis is on the convergence of VoIP, PSTN and cell phone networks and signaling. Topics include voice processing as well as IP and SS7 signaling. In addition there will be a review of ISDN, DSL, Sonet, ATM, SIP and MPLS. There will be a case problem for sizing a VoIP network using silence suppression. Formerly TLEN 5340.
Requisites: Requires corequisite of CYBR 5001. Restricted to CYBR or BUSN graduate students.

CYBR 5350 (3) Security Auditing and Penetration Testing
This course is an introduction to the principles and techniques associated with security auditing and penetration testing. Topics covered include; planning, reconnaissance, scanning, enumeration, exploitation, post-exploitation, and reporting. Students discover how system vulnerabilities can be exploited. Students will develop an understanding of current cybersecurity issues and how user, administrator, and programmer errors can result in security breaches.
Recommended: Prerequisites CYBR 5300 or CSCI 3403 or CSCI 5403.

CYBR 5400 (3) Principles of Internet Policy
Engages in the critical strategic analysis and debate of controversial public policy issues raised by the Internet. Learn how to develop well-reasoned positions on the regulations applied to new Internet-based technologies and business models based on interdisciplinary frameworks that characterize the significant intersection of technology, economics, business, and public policy. Policy topics covered include Broadband as a Universal Service, Net Neutrality, Spectrum Management, Online Privacy, and Cybersecurity.

CYBR 5410 (3) Telecommunications Law and Policy
Examines laws governing telecommunications industries, including federal and state regulation and international aspects. Includes telephone, cable, satellite, cellular and other wireless systems and the Internet. Formerly TLEN 5240.
Equivalent - Duplicate Degree Credit Not Granted: LAWS 7241
Repeatable: Repeatable for up to 6.00 total credit hours.
Requisites: Restricted to CYBR or BUSN graduate Students

CYBR 5420 (3) Spectrum Management and Policy
Studies how spectrum policy is developed and implemented. A general framework is developed for understanding telecommunications law and regulatory objectives. Specifically analyzes international and domestic dimensions of spectrum policy. Considers how economics, administrative processes and innovative technologies affects management of the spectrum. Formerly TLEN 5230.
Requisites: Restricted to graduate students only.

CYBR 5505 (3) Leading Oneself
Provides working engineers a background in leadership concepts and methods and enables students to develop practical leadership skills through numerous in-class exercises and experimentation based assignments. Topics include authentic leadership, motivating self and others, cultivating emotional intelligence, personal mastery, creating accountability, conflict resolution, leading change and organizational culture. Required for all Engineering Management degree students.
Requisites: Restricted to Leeds School of Business or College of Engineering graduate students only.

CYBR 5510 (3) Technology: Commercial Strategy and Operations
Working in groups of 2 to 4, students will leverage their technical skills to learn and apply commercial/business skills via the consideration of a hypothetical competitive technically-oriented business, including its strategy, long-term financial outlook, and operating platform. Upon successful course completion, students should expect to feel confident when speaking with (and ultimately moving into roles of) management and leadership, regarding all critical aspects of business, especially the creation of equity value through scale at pace, aligning interests of all key stakeholders. Open to undergraduates with instructor consent.
Requisites: Restricted to graduate students only.

CYBR 5550 (3) Designing for Defense 1
Designing for Defense/Hacking for Defense is a national service program running at leading research universities across the country. Interdisciplinary teams¿chosen by competitive selection¿work on real-world national security challenges, in close contact with national security agencies. Teams employ the Lean Launchpad entrepreneurship methodology to develop engineering and business concepts to solve real-world challenges for special operations forces, the intelligence community, and other government agencies. Winning teams are eligible for real-world capital investment. The first semester of a two-course sequence. Students take this course, ASEN/CSCI/CYBR 5550, and ASEN/CSCI/CYBR 5580 contiguously as the sequence spans the academic year.
Equivalent - Duplicate Degree Credit Not Granted: ASEN 5550 and CSCI 5550
Grading Basis: Letter Grade

CYBR 5580 (3) Designing for Defense 2
This course allows teams to continue their D4D journey from semester 1 guiding students in launching a business entity that will deploy agile development tools to refine and enhance their first semester MVP, seek funding for that development work, deliver a functioning solution to their sponsor, and extract real value for the members of the business unit.
Equivalent - Duplicate Degree Credit Not Granted: ASEN 5580 and CSCI 5580
Requisites: Requires prerequisite course of ASEN 5550 or CSCI 5550 or CYBR 5550 (minimum grade B). Restricted to graduate students only.
Grading Basis: Letter Grade

CYBR 5620 (3) Advanced Wireless Lab
Provides a comprehensive, hands-on set of laboratory exercises for the teaching and demonstration of key technical skills required to understand, build, test, and analyze both analog and digital wireless communications concepts. In conjunction with lecture-based content to provide a solid foundation in digital communication theory, SDR-based laboratory exercises enable the synthesis of several fundamental concepts utilizing the latest, modern communications systems technologies.
Equivalent - Duplicate Degree Credit Not Granted: CSCI 5620
Requisites: Requires prerequisite course of CSCI 5200 or CYBR 5200 (minimum grade B).
Recommended: Prerequisites CYBR 5630 or CSCI 5630 and CYBR 5220 or CSCI 5220.

CYBR 5630 (3) Wireless and Cellular Systems
Studies technologies and architectures employed in modern cellular wireless systems. Major topics include radio propagation, multiple access techniques, analog and digital cellular telephony, and personal communications systems. Presents the necessary tools to understand the wireless industry, its technical details, and its business drivers. Topics include modeling, spectrum, weather, multipath, Doppler effect, and shadowing and covers important aspects of multiple access technologies such as CDMA and OFDMA. introduces modern radio standards including LTE.
Equivalent - Duplicate Degree Credit Not Granted: CSCI 5630
Requisites: Requires prerequisite course of CSCI 5200 or CYBR 5200 (minimum grade B).

CYBR 5830 (1-6) Special Topics
Current topics in technology, cybersecurity and policy.
Repeatable: Repeatable for up to 18.00 total credit hours. Allows multiple enrollment in term.
Requisites: Restricted to graduate students only.

CYBR 5910 (1-6) Independent Study
Special projects agreed upon by student and instructor. Department consent required. Formerly TLEN 5920.
Repeatable: Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
Requisites: Restricted to CYBR/TLEN graduate students.

CYBR 6940 (1) Master's Candidate for Degree
This course is for TCP Master's students who are approved candidates to receive their degree.
Requisites: Restricted to CYBR/TLEN graduate students.

CYBR 6950 (1-6) Master's Thesis
Original and independent research conducted by a graduate student under the supervision of a faculty advisor. Formerly TLEN 6950.
Requisites: Restricted to CYBR/TLEN graduate students.

CYBR 8990 (1-10) Doctoral Dissertation
Investigates specialized topic or field in the area of telecommunications. Approved and supervised by faculty members. Formerly TLEN 8990.
Requisites: Restricted to CYBR/TLEN PhD students.