

DEPARTMENT OF COMPUTER SCIENCE AND INFORMATION TECHNOLOGY

Dr. Kuang-Nan Chang, Chair

Dr. Mengkun Yang, Graduate Coordinator/Advisor

www.cs.eku.edu (<http://www.cs.eku.edu>)

(859) 622-2398

Master's

- Computer Science, Master of Science with a Concentration in Artificial Intelligence in Data Science (M.S.) (<http://catalogs.eku.edu/graduate/science-technology-engineering-mathematics/computer-science-information-technology/computer-science-concentration-artificial-intelligence-data-ms/>)
- Computer Science, Master of Science with a Concentration in Cyber Security and Digital Forensics (M.S.) (<http://catalogs.eku.edu/graduate/science-technology-engineering-mathematics/computer-science-information-technology/computer-science-concentration-cyber-security-digital-forensics-ms/>)
- Computer Science, Master of Science with a Concentration in Game Design (M.S.) (<http://catalogs.eku.edu/graduate/science-technology-engineering-mathematics/computer-science-information-technology/computer-science-concentration-game-design-ms/>)

Certificate

- Artificial Intelligence in Data Science, University Certificate (<http://catalogs.eku.edu/graduate/science-technology-engineering-mathematics/computer-science-information-technology/artificial-intelligence-data-science-certificate/>)
- Cyber Security and Digital Forensics, University Certificate (<http://catalogs.eku.edu/graduate/science-technology-engineering-mathematics/computer-science-information-technology/cyber-security-digital-forensics-certificate/>)
- Game Design, University Certificate (<http://catalogs.eku.edu/graduate/science-technology-engineering-mathematics/computer-science-information-technology/game-design-certificate/>)

Courses

Computer Science

CSC 707. Special Topics: Comp Sci: _____. (1-3 Credits)

A. Prerequisite: departmental approval. Topics vary with offering. May be retaken to a maximum of six hours, with advisor approval, provided the topics are different.

CSC 720. Multimedia Systems & Forensics. (3 Credits)

A. Prerequisite: admission to the master's degree program in computer science departmental approval. Integration of multimedia technologies, signal processing and compression of images, audio, and video, multimedia forensics and message hiding.

CSC 730. Programming and Data Structure. (3 Credits)

A. Prerequisites: CSC 801 or departmental approval. The application and implementation of data structures including arrays, linked lists, stacks, queues, heaps, trees and graphs and their related algorithms, using an object-oriented programming language.

CSC 735. Discrete Structures. (3 Credits)

A. Prerequisite: MAT 107 or departmental approval. Corequisite: CSC 730. Logic, sets, functions, Boolean algebra, probability and their applications, number theory, recursion, math induction, proofs with application of these topics to computer science. Credit does not apply toward the M.S. degree in Mathematical Sciences.

CSC 736. Incident Response I. (3 Credits)

A. Prerequisites: CSC 801 or departmental approval. This course discusses the details of various aspects of cybersecurity incident response. Topics include pre-incident preparation, incident detection and characterization, data collection and analysis, and remediation.

CSC 737. Incident Response II. (3 Credits)

A. Prerequisites: CSC 801 or departmental approval. This course discusses cybersecurity incident response in the context of various computing platforms. Topics include dead-box analysis, memory analysis, log analysis, and malware analysis in Windows, Linux and MacOS Systems.

CSC 738. Computer Crime and Forensics. (3 Credits)

A. Study of computer crime and forensics. Computer criminal evidence collection, analysis, and handling; computer forensics tools; data acquisition; digital evidence control; Windows and Linux systems investigation; email investigation; network forensics; computer forensic reporting.

CSC 739. MAC Forensics. (3 Credits)

(3) A. Prerequisite: departmental approval. This course covers the basic knowledge and skills necessary to analyze MAC operating system artifacts for digital evidence recovery. The topics include: MAC OS overview, GPT partitioning system, MAC system acquisition, MAC directory structure and evidence, Property lists, User logon password recovery, Safari and Firefox artifacts, iChat artifacts, Apple mail analysis, and other related topics.

CSC 741. Software Testing. (3 Credits)

(3) A. Prerequisite: CSC 730. The purpose of this course is to study software testing process, methods, techniques and tools. Topics include black box testing, white box testing, integration testing, acceptance testing, regression testing, performance testing, stress testing, and testing of object-oriented software.

CSC 742. Internet Forensics. (3 Credits)

(A). Prerequisite: CSC 730 or departmental approval. This course covers the basic knowledge and skills necessary to analyze Internet-based applications artifacts for digital evidence recovery. The topics include popular Web browsers, instant messengers, and social media apps.

CSC 743. Windows Forensics. (3 Credits)

(3) A. Prerequisite: departmental approval. This course covers the basic knowledge and skills necessary to analyze MS Windows operating system artifacts for digital evidence recovery. The topics include: Windows OS overview, System bitlocker, GPT file system, Windows Security Model, Windows registry, USB devices, Windows event logs, Windows recycle bin, and other related topics.

CSC 744. Database Admin and Security. (3 Credits)

A. Prerequisites: CSC 801 or departmental approval. This course covers database management system concepts, database system architecture, installation and setup, data management, performance monitoring and tuning, backup and recovery, database security models and management, database auditing.

CSC 745. Theory of Database Systems. (3 Credits)

A. Prerequisite: CSC 730 or departmental approval. Models and principles of information systems. Database languages. The logical and physical design as well as the implementation and use of database systems.

CSC 746. Artificial Intelligence. (3 Credits)

A. Prerequisites: CSC 801 or departmental approval. The use of programming languages to model concepts selected from artificial intelligence. The application of heuristics to problem solving. Perception and pattern recognition.

CSC 747. Network Forensics & Invest. (3 Credits)

A. Introduction to Windows network forensics. Topics include: Windows network structure; Windows password/authentication mechanisms; Windows ports and services; Live-analysis techniques; Windows registry structure and evidence; Forensic analysis of events logs; Network forensics tools and reporting.

CSC 748. Personal Elec. Device Forensic. (3 Credits)

A. Prerequisite: CSC 730 or departmental approval. Introduction to personal electronic device forensics. Topics include architecture, functionality, operating systems, and implementation of PEDs (cell phones, PDAs, iPod, MP3 music players, GPS devices), recovering evidence from PEDs, and hostile forensic and booby-trapping techniques.

CSC 749. Computer Forensics Capstone. (3 Credits)

A. Prerequisite: CSC 730 or departmental approval. Project course. Students apply learned digital forensic knowledge, techniques, and software and hardware tools to work on a team project on a case for digital evidence collection, handling, analysis, and reporting.

CSC 750. Graphics Programming. (3 Credits)

A. Prerequisite: CSC 730 or departmental approval. 3-D geometry, model transformation, matrices, computer algorithms and protocols, texture mapping, camera control, and collision detection.

CSC 755. Topics in Multimedia:_____. (3 Credits)

A. Prerequisite: departmental approval. For advanced students in computer science. Subject announced when offered. May be retaken to a maximum of six hours, provided that the topics are different.

CSC 781. Machine Learning. (3 Credits)

A. Prerequisites: CSC 801 or departmental approval. Introduction to Machine Learning and its core models and algorithms. Hands-on R programming experiences of using machine learning/deep learning algorithms to analyze real-world data sets.

CSC 782. Big Data. (3 Credits)

A. Prerequisites: CSC 801 or departmental approval. Advanced cutting edge and state-of-the-arts knowledge and implementation in big data. Modern deep learning tools for analyzing real-world data sets.

CSC 783. Data Visualization. (3 Credits)

A. Prerequisites: CSC 801 or departmental approval. Principles and techniques for data visualization, including visual representation methods and techniques for increasing the understanding of complex data and models. Hands-on visual programming experiences in data collection and demonstration.

CSC 801. Object-Oriented Programming. (3 Credits)

(3) I, II. Prerequisite: Admission to the Master's degree program in Computer Science or Departmental approval. The problem solving and algorithm design through object-oriented programming. Topics include core concepts in a high-level programming language (data types, control structures, arrays, and exception handling) as well as object-oriented techniques (classes, objects, methods, inheritance and polymorphism.)

CSC 812. Microc Architecture & Software. (3 Credits)

A. Prerequisite: CSC 730 or departmental approval. Topics suitable for a microcomputer laboratory systems manager including IBM PC architecture and assembly language, local area networks, MS DOS, copyright law, viruses.

CSC 815. Computer Admin and Security. (3 Credits)

A. Prerequisites: CSC 801 or departmental approval. Operating system concepts, installation and setup system administration, managing system services, program security, viruses and worms, encryption, information database security, security policies, legal and ethical issues.

CSC 825. Network Applic and Security. (3 Credits)

A. Prerequisites: CSC 801 or departmental approval. Local Area Networks, TCP/IP, Internet Protocols, Client/Server applications. Dynamic web pages, Internet security, firewalls, virtual private networks, network attacks, Web and E-commerce security, wireless networking and security.

CSC 831. Databases and Algorithms. (3 Credits)

A. Prerequisites: CSC 801 or departmental approval. Models and principles of information systems and database languages. The logical and physical design as well as the implementation and use of database systems.

CSC 833. Data Structure & Algorithms II. (3 Credits)

A. Prerequisite: CSC 831. Pattern matching, graph theory algorithms, computational complexity, and cryptography.

CSC 834. Software Engineering. (3 Credits)

A. Prerequisites: CSC 801 or departmental approval. Planning, organizing, monitoring, and controlling the implementation of a software project.

CSC 835. Project Management. (3 Credits)

A. Prerequisites: CSC 801 or departmental approval. A survey of current issues in Software Engineering, software testing, metrics, quality assurance, software reuse, and re-engineering.

CSC 839. Co-op or Appl Lrn: Comp Scienc. (0.5-3 Credits)

Prerequisite: departmental approval. May be retaken with approval to a maximum of three credit hours. Employment with faculty and field supervision in an area related to the student's academic interests. A Minimum of eighty hours of employment is required for each academic credit.

CSC 839A. Coop Study: Computer Science. (0.5-3 Credits)

A. Prerequisite: departmental approval. May be retaken with approval to a maximum of three credits. Employment with faculty and field supervision in an area related to the student's academic interests. A minimum of eighty hours of employment is required for each academic credit.

CSC 839B. Coop Study: Computer Science. (0.5-3 Credits)

A. Prerequisite: departmental approval. May be retaken with approval to a maximum of three credits. Employment with faculty and field supervision in an area related to the student's academic interests. A minimum of eighty hours of employment is required for each academic credit.

CSC 839C. Coop Study: Computer Science. (0.5-3 Credits)

A. Prerequisite: departmental approval. May be retaken with approval to a maximum of three credits. Employment with faculty and field supervision in an area related to the student's academic interests. A minimum of eighty hours of employment is required for each academic credit.

CSC 839D. Coop Study: Computer Science. (0.5-3 Credits)

A. Prerequisite: departmental approval. May be retaken with approval to a maximum of three credits. Employment with faculty and field supervision in an area related to the student's academic interests. A minimum of eighty hours of employment is required for each academic credit.

CSC 839E. Coop Study: Computer Science. (0.5-3 Credits)

A. Prerequisite: departmental approval. May be retaken with approval to a maximum of three credits. Employment with faculty and field supervision in an area related to the student's academic interests. A minimum of eighty hours of employment is required for each academic credit.

CSC 842. Parallel Algorithms. (3 Credits)

A. Prerequisite: CSC 831. The design and analysis of parallel algorithms. Application to merging, sorting, combinatorics and numerical algorithms.

CSC 860. System Prog & Administration. (3 Credits)

A. Prerequisite: CSC 730. Operating system concepts, concurrent programming, scheduling, security, recovery, methods and languages for operating system management. Layering protocols for computer networks, inter-process communications, TCP/IP Internet protocols, Web programming, and Web server management. Credit does not apply toward the M.S. degree in Mathematical Sciences.

CSC 880. Seminar in : _____ . (1-3 Credits)

A. Prerequisite: departmental approval. Advanced topics in computer science. May be retaken to a maximum of six hours provided the topics are different.

CSC 890. Independent Study in _____. (1-3 Credits)

A. Prerequisite: departmental approval. Independent study on a problem chosen by the student and instructor. Student must have the independent study form and course syllabus approved by faculty supervisor and department chair prior to enrollment. May be retaken to a maximum of nine hours, provided that the topics are different.

CSC 895. Applied Computing Project in:_. (3-6 Credits)

A. Prerequisite: departmental approval. An individually developed project related to the solution of a typical problem in an applied computing environment. The result is to be presented in open forum. Credit does not apply towards the M.S. degree in Mathematical Sciences.

Informatics**INF 707. Special Topics in Informatics_. (1-3 Credits)**

(1-3) A. Prerequisite: departmental approval. Topics vary with offering. May be retaken to a maximum of six hours with advisor approval, provided the topics are different.

INF 711. Princ of Game Des and Gam Theo. (3 Credits)

A. Fundamentals of designing both digital and non-digital games. In depth study of the nature of "Fun," design philosophies, choice, motivation, flow theory, types of decisions, and reward in gameplay systems. Additional topics related to gamification, monetization, and serious games also covered.

INF 712. Game Production and Publicatio. (3 Credits)

A. Review of historical and current aspects of the games industry from AAA to indie. Industry operations, Employment, Founding your own studio, Funding, Freelancing, the Role of Influencers (Twitch, Youtube, social media), Platforms, IP protection.

INF 713. Online Game and App Design. (3 Credits)

Introduction to the principles of design for online games and applications. Topics include game balance, competition, cooperation, detecting exploits and cheating, security, privacy, social structures, administration, community management, online harassment, and client-server communication. Credit will not be awarded for both INF 713 and INF 513 .

INF 715. Special Topics in Gaming:____. (3 Credits)

A. Topics vary with offering. May be retaken to a maximum of six hours with advisor approval, provided the topics are different. Credit will not be awarded to students who have credit for INF 707: Special Topics in Informatics. Credit will not be awarded for both INF 715 and INF 515.

INF 718. Principles of Cybersecurity. (3 Credits)

A. Pre-requisite: departmental approval. This course discusses cybersecurity principles. Topics include security governance, risk assessment, security, people, information, and physical asset management; system development, access, and management; threat and incident management; business continuity; security monitoring and improvement.