

COMPUTER SCIENCE (CSC)

CSC 101. The World of Code. (3 Credits)

A. Prerequisite: Completion of all academic readiness requirements. Introduction to computational thinking through the exploration of code, its place in our lives, and the use of code for problem-solving. A beginning programming language will be used to explore key coding concepts such as making decisions and repetition.

CSC 140. Introduction to Computer Game Design. (3 Credits)

I, II. Prerequisite: a grade of "C" or higher in both CSC 185 and CSC 190. Introduction to computer game design, frame based animation, sound effects, program logic, game scripting, and object oriented programming.

CSC 160. Introduction to Web Programming. (3 Credits)

A. Prerequisite: MAT 112 A/B or higher with a grade of "C" or higher, or a minimum score of 22 on the mathematics portion of the ACT, or a minimum score of 530 on the math portion of the SAT, or a passing grade of the math Algebra placement test. Introduction to problem solving with computers and the Internet using an appropriate programming language. Basic concepts include data types, objects, control structures, functions, and input/output features. Gen. Ed. VII (QS).

CSC 170. Intro to Game Programming. (3 Credits)

A. Prerequisite: MAT 112 or 112B or 114 with a grade of "C" or better, or Math ACT score of 23 or higher, or Math SAT score of 560 or higher. Introduction to game programming using Python. Programming concepts including data types, input/output, and control structures will be introduced through the construction of various types of 2-D games. 3 Lecture/Lab.

CSC 174. Introduction to Programming for Science & Engineering. (3 Credits)

I, II. Prerequisite: MAT 122 or higher with a minimum grade of C, a minimum score of 25 on the mathematics portion of the ACT, or a minimum score of 590 on the math portion of the SAT. Introductory programming for scientific and engineering applications, input/output, decision, loops, arrays, subroutines, functions, files and simulation. Gen. Ed. VII (QS).

CSC 177. Introduction to Visual Basic. (3 Credits)

I, II. Prerequisite: MAT 112 A/B or higher with a grade of "C", or a minimum score of 22 on the mathematics portion of the ACT, or a minimum score of 530 on the math portion of the SAT, or a passing score on a math Algebra placement test. Introduction to programming in the event driven/graphical programming language Visual Basic. Topics include forms, common controls/objects, coding, procedures, file management and developing Windows applications. Gen. Ed. VII (QS).

CSC 178. Introduction to _____. (1-3 Credits)

A. Prerequisite: Minimum ACT Math score of 19, Minimum SAT math score of 510, or completion of MAT 105 or higher with a "C" or higher grade. Introduction to selected topics in computer science. May be retaken to a maximum of nine hours, provided the topics are different.

CSC 185. Discrete Structures I. (3 Credits)

I, II. Prerequisite: MAT 122 or higher with a grade of "C" or higher, or a minimum score of 25 on the mathematics portion of the ACT, or a minimum score of 590 on the math portion of the SAT. Introduce basic mathematical structures and logical principles for computer science. Practice step-by-step problem solving in support of good algorithm design and verification practices. Topics include basic counting, sequences, series and recurrence relations.

CSC 189. Computing Concepts and Programming. (3 Credits)

(3) A. Prerequisite: MAT 122 or higher (minimum grade of C) or a minimum of 25 on the mathematics portion of the ACT or a minimum of 590 on the mathematics portion of the SAT. Introduction to the computing concepts and programming. Topics include numbering systems, computing system concepts, problem solving with computers using an object-oriented programming language. 2 Lec/2 Lab.

CSC 190. Object- Oriented Programming I. (3 Credits)

I, II. Prerequisite: MAT 122 or higher with a grade of "C" or higher, a minimum of 25 on the mathematics portion of the ACT or a minimum of 590 on the mathematics portion of the SAT. Introduction to problem solving with computers using an object-oriented programming language. Concepts include data types, input/output, classes, control structures, and arrays. 3 Lec/2 Lab. Gen. Ed. VII (QS).

CSC 191. Object-Oriented Programming II. (3 Credits)

I, II. Prerequisite: a minimum grade of "C" in both CSC 185 and CSC 190. Object-oriented programming, recursion, arrays, inheritance, file input/output, exception handling, multi-thread programming, GUI, object-oriented analysis and design. 3 Lec/2 Lab.

CSC 195. Discrete Structures II. (3 Credits)

I, II. Prerequisites: a minimum grade of "C" in both CSC 185 and CSC 190. Develop foundation and analysis technique in mathematical structures for computing. Topics include sets, relations, functions; logic; algorithm design/ analysis, recursive algorithms, recurrence relations, mathematical induction, counting, probability. 3 Lec/2 Lab.

CSC 210. Data Structures and Programming. (3 Credits)

(3) A. Prerequisite: A minimum grade of "C" in CSC 189 or CSC 190. Object-oriented programming, inheritance, arrays, stacks, queues, trees, hashing, recursions, and exception handling. 3 Lec/2 Lab.

CSC 250. Intro to Interactive Games/App. (3 Credits)

A. Prerequisite: CSC 190 with a minimum grade "C". Introduction to multimedia programming and scripting. Topics include frame-based animation, video editing, sound effects, program logic, and object-oriented programming. Credit will not be awarded to student who have credit for for CSC 140.

CSC 302. Introduction to System Environ. (3 Credits)

I, II. Prerequisite: CSC 191 with a minimum of grade of $\geq C-\geq$. Introduction to computer system environments, utilities, system programming, system administration, networking and operating systems.

CSC 306. Ethics for the Comput Profess. (3 Credits)

A. Prerequisite: CSC 191 with a minimum grade of $\geq C-\geq$ Responsibilities of the computing professional, social implications of computing, privacy, crime and abuse, risk and liabilities, copyright, and patents.

CSC 308. Mobile App Development for Apple iOS. (3 Credits)

Prerequisite: A minimum grade of "C" in CSC 191 and CSC 195 or in CSC 210. Introduction to developing mobile applications for Apple iOS. Topics include development tools, APIs, user interfaces, mobile-specific technologies and application design.

CSC 309. Mobile App Dev for Android. (3 Credits)

(3) A. Prerequisite: A minimum grade of "C" in CSC 191 and CSC 195 or in CSC 210. Introduction to developing mobile device web sites and applications for Android. Topics include development tools, APIs, user interfaces, mobile-specific technologies and application design.

CSC 310. Data Structures. (3 Credits)

I, II. Prerequisites: CSC 191 and CSC 195 with a minimum grade of C in both. The application and implementation of data structures including arrays, stacks, queues, linked lists, and trees. Internal searching and sorting techniques. The analysis of algorithms.

CSC 311. Algorithms I. (3 Credits)

A. Prerequisites: CSC 191, CSC 195, and MAT 234 or MAT 234H with a grade of "C" or better in all three courses. Logic and proof, mathematical induction; order of magnitude, recurrence, relations, analysis of recursive algorithms; Boolean algebra and logic networks, networks for adding, merging and sorting; matrices; finite state machines, push-down automata, linear bound automata, Turing machines; formal languages.

CSC 312. File Processing. (3 Credits)

I, II. Prerequisite: CSC 310 with a minimum grade of "C". File organization and file storage devices. Topics include external sorting, sequential file processing, hashing, B+ trees, and introduction to databases.

CSC 313. Database Systems. (3 Credits)

A. Prerequisite: A minimum grade of "C" in CSC 191 and CSC 195 or in CSC 210. Introduction to databases, storage and retrieval of data, report generation, interface and application development, online queries, XML, multimedia database, and database security.

CSC 315. 3D Modeling. (3 Credits)

A. Prerequisite: CSC 191 and CSC 195 with a grade of "C" or better in both courses. An introduction to geometric representations in 3D. Topics include polygon and spline modeling, texture mapping, materials, 3D scanning, and topics in animation including character rigging.

CSC 316. 3D Game Engine Design. (3 Credits)

A. Prerequisite: A grade of "C" or higher in CSC 310. Introduction to 3D animation and programming. Topics include coordinate systems, vertices, lines, polygons, geometric objects, 3D models, motion control, and interaction design.

CSC 320. Algorithms II. (3 Credits)

A. Prerequisites: CSC 310 and 311 with a minimum grade of "C" in both courses. Fundamental algorithms required in computer science; algorithm design/analysis methods, graph algorithms, probabilistic and parallel algorithms, and computational models.

CSC 330. System Environments & Networks. (3 Credits)

A. Prerequisite: A minimum grade of "C" in CSC 191 or in CSC 210. Introduction to computer system environments, utilities, system administration, and networking.

CSC 332. Digital Storage Device Forensics. (3 Credits)

A. Prerequisite: a minimum grade of "C" in CSC 210 or CSC 310. Introduction to digital storage forensics. Topics include digital investigation fundamentals, fundamentals of storage devices (hard disk, optical, flash, consumer electronics devices, and mobile devices), disk volume analysis, and file systems analysis (FAT/NTFS, Ext 2/3/4, UFS 1/2, HFS/HFS+/HFSX).

CSC 338. Fundamentals of Cybersecurity. (3 Credits)

Pre-requisite: A minimum grade of "C" in CSC 210 or CSC 310. This course discusses the fundamentals of cybersecurity. Topics include information security principles, network and Internet basics, hacker techniques, cybersecurity technologies, encryption, security policies, cyber terrorism and information warfare, cyber detective, digital forensics, cybersecurity engineering, and society security.

CSC 340. Ethics & Software Engineering. (3 Credits)

A. Prerequisite: CSC 310 and 313 with a minimum grade of "C" in both courses. Responsibilities of software professionals, social implications of software such as privacy, crime and abuse, risk and liabilities, copyright, and patents, software project planning, software requirements analysis, software design, and software testing.

CSC 349. Applied Learning in Computer Science. (0.5-8 Credits)

I, II; (1-6) SUMMER ONLY. Prerequisite: students must have successfully completed 30 semester hours of course work including six hours of Computer Science major courses. In addition, transfer students must have completed at least one semester of full-time course work at EKU. Work in placements related to academic studies. A maximum of three hours may be applied toward the Computer Science technology option degree only. Credit does not apply to general Computer Science major or minor requirements. Total hours: eight, associate; sixteen, baccalaureate. A minimum of 80 hours of employment is required for each semester hour of academic credit. Credit may only be awarded in the semester in which the work is completed.

CSC 349A. Cooperative Study: Computer Science. (0.5-8 Credits)

I, II; (1-6) SUMMER ONLY. Prerequisite: students must have successfully completed 30 semester hours of course work including six hours of Computer Science major courses. In addition, transfer students must have completed at least one semester of full-time course work at EKU. Work in placements related to academic studies. A maximum of three hours may be applied toward the Computer Science technology option degree only. Credit does not apply to general Computer Science major or minor requirements. Total hours: eight, associate; sixteen, baccalaureate. A minimum of 80 hours of employment is required for each semester hour of academic credit. Credit may only be awarded in the semester in which the work is completed.

CSC 349B. Cooperative Study: Computer Science. (0.5-8 Credits)

Work in placements related to academic studies.

CSC 349C. Cooperative Study: Computer Science. (0.5-8 Credits)

Work in placements related to academic studies.

CSC 349D. Cooperative Study: Computer Science. (0.5-8 Credits)

Work in placements related to academic studies.

CSC 349E. Cooperative Study: Computer Science. (0.5-8 Credits)

Work in placements related to academic studies.

CSC 349F. Cooperative Study: Computer Science. (0.5-8 Credits)

Work in placements related to academic studies.

CSC 349G. Cooperative Study: Computer Science. (0.5-8 Credits)

Work in placements related to academic studies.

CSC 349H. Cooperative Study: Computer Science. (0.5-8 Credits)

Work in placements related to academic studies.

CSC 350. Principles of Prog Languages. (3 Credits)

I, II. Prerequisites: CSC 200 and 310 with a minimum grade of "C" in both courses. The principles used in the design and implementation of programming languages. Language descriptions, structural implementations, and specialized features of languages.

CSC 360. Computer Org & Architecture. (3 Credits)

(3) A. Prerequisite: CSC 191 with a minimum grade of "C" or CSC 210. Information representation, instruction set architecture, assembly language, instruction execution, basic processing units, input/output organization, memory and storage organization, overlap and pipeline processing, parallel processing, and performance evaluation. Credit will not be awarded for both CSC 360 and 370.

CSC 390. Advanced Programming Techniques with _____. (3 Credits)

A. Prerequisite: CSC 191, with a minimum grade of "C." Advanced programming with a selected programming language, with appropriate applications. May be taken to a maximum of six hours, provided the languages are different.

CSC 400. Operating Systems. (3 Credits)

I, II. Prerequisites: CSC 310 and 360 with a grade of "C" or higher in both courses. Overall structure of multiprogramming systems, details of addressing techniques, memory-management, file system design and management, traffic control, interprocess communication, system module design, interfaces.

CSC 401. Network & System Programming. (3 Credits)

A. Prerequisites: CSC 302, CSC 370 or EET 254. Technical programming in the UNIX and the Internet environments: shell scripts, TCP/IP, HTML, CGI, and JavaScript. Survey of Internet protocols.

CSC 410. Cyber Networking and Security. (3 Credits)

(3) A. Prerequisite: CSC 210 or CSC 310 with a minimum grade of "C". This course discusses the fundamentals of computer networking and cyber security. Topics include layered protocols of computer network, Internet architecture and applications, cyber security and defense technologies.

CSC 440. Applied Software Engineering. (3 Credits)

A. Prerequisite: A minimum grade of "C" in CSC 340. Techniques and tools for software requirements, software design, software testing, and software project planning as a team project for majors in computer science.

CSC 460. Computer Network & System Administration. (3 Credits)

A. Prerequisite: A minimum grade of "C" in CSC 210 CSC 310. Introduction to the subject of computer networks and layered protocols, architecture of data communication systems, point-to-point networks, local networks, end-to-end protocols and internetworking, and server-side technology to create interactive web pages.

CSC 490. Seminar in _____. (1-3 Credits)

A. Prerequisite: departmental approval. For advanced students in computer science. Subject announced when offered. May be retaken to a maximum of 12 hours, provided that the topics are different.

CSC 491. Game Design Capstone. (3 Credits)

A. Prerequisite: CSC 140 and INF 391 with a grade of "C" or higher. Level design, storyboarding, character modeling, game scripting, game interface design, audio effects, marketing, and ethics. Students will work in groups to develop a computer game term project. May be retaken to a maximum of 6 hours.

CSC 494. Innovative Problem Solving. (1-3 Credits)

Prerequisite: Departmental approval. An individually developed project related to an innovative solution of a problem provided by the software industry. The result is to be presented in open forum. May be retaken to a maximum of 6 hours provided the topics are different.

CSC 495. Independent Work. (1-3 Credits)

I, II. Prerequisite: A grade of "C" or higher in ENG 102, 105 (B), or HON 102 and departmental approval. Directed study/ research on a problem or area chosen in consultation with the instructor. Final paper required. Student must have the independent study proposal form approved by faculty supervisor and department chair prior to enrollment. May be retaken to a maximum of twelve hours.

CSC 496. Senior Seminar. (1 Credit)

Prerequisite: CSC 340 with a minimum grade of "C". Critically evaluate current issues in computer science and effectively communicate creative ideas with professionals to foster collaborative problem solving.

CSC 499. CS Career Preparation. (1 Credit)

A. Prerequisite: CSC 310 with a grade of "C" or better. Career preparation for students seeking internship or permanent jobs. Job search, resume creation, interview techniques for application of computer science positions. 2 Lec.

CSC 507. Special Topics:_____. (1-3 Credits)

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

CSC 520. Multimedia System and Forensics. (3 Credits)

A. Prerequisite: A minimum grade of "C" in CSC 210 CSC 310. Integration of multimedia technologies, signal processing and compression of images, audio, and video, multimedia forensics and message hiding.

CSC 530. Programming and Data Structures. (3 Credits)

A. Prerequisite: At least a "C" in CSC 190 and 191, or equivalent courses. 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. Credit does not apply to the B.S. degree in Computer Science or the B.S. degree in Digital Forensics and Cybersecurity.

CSC 535. Discrete Structures. (3 Credits)

A. Prerequisite: MAT 112, 114 or equivalent. Corequisite: CSC 530. Logic, sets, functions, Boolean algebra, probability and their applications, number theory, recursion, math induction proofs with application of these topics to computer science.

CSC 536. Incident Response I. (3 Credits)

(3) A. Prerequisite: CSC 410 with a minimum grade of "C". 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 537. Incident Response II. (3 Credits)

(3) A. Prerequisite: CSC536 with a minimum grade of "C". 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 538. Computer Crime and Forensics. (3 Credits)

A. Introductory course on 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 report writing.

CSC 539. MAC Forensics. (3 Credits)

(3) A. Prerequisite: INF 322. 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 541. Software Testing. (3 Credits)

(3) A. Prerequisites: Senior standing and CSC 310 with a grade of "C" or higher. 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 542. Internet Forensics. (3 Credits)

(A). Prerequisite: INF 322 with a minimum grade of "C". 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 543. Windows Forensics. (3 Credits)

(3) A. Prerequisite: INF 322. 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 544. Database Admin and Security. (3 Credits)

Prerequisite: A minimum grade of "C" in CSC 210 or CSC 310. 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 545. Theory of Database Systems. (3 Credits)

A. Prerequisite: A minimum grade of "C" in CSC 210 or CSC 310. Models and principles of information systems. Database languages. The logical and physical design as well as the implementation and use of database systems.

CSC 546. Artificial Intelligence. (3 Credits)

A. Prerequisite: A minimum grade of "C" in CSC 210 or CSC 310 and STA 270. The use of programming languages to model concepts selected from artificial intelligence. The application of heuristics to problem solving. Perception and pattern recognition.

CSC 547. Network Forensic and Investigation. (3 Credits)

A. Prerequisites: Senior standing and CSC 400 with a grade of "C" or higher. 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 548. Personal Electronic Device Forensics. (3 Credits)

A. Prerequisite: CSC 332 with a grade of "C" or higher. Introduction to personal electronic device forensics. Topics include architecture, functionality, operating systems implementation of PEDs (cell phones, PDAs, iPod, MP3 music players, GPS devices), recovering evidence from PEDs, and hostile forensic and booby-trapping techniques.

CSC 549. Computer Forensics Capstone. (3 Credits)

A. Prerequisite: CSC 332 with a grade of "C" or higher. 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 550. Graphics Programming. (3 Credits)

A. Prerequisites: CSC 316 with a grade of "C" or higher. 3-D geometry, model transformation, matrices, computer algorithms and protocols, texture mapping, camera control, and collision detection.

CSC 555. 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 581. Machine Learning. (3 Credits)

(3) A. Prerequisites: A grade of "C" or higher in CSC 210 or 310 and STA 270. 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 582. Big Data. (3 Credits)

(3) A. Prerequisites: A grade of "C" or higher in all CSC 310. 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 583. Data Visualization. (3 Credits)

(3) A. Prerequisites: CSC 310. 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 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.