# CSCI - Computer Science

CSCI 102 - Computer Fundamentals for Cyber Security (4)

Students will learn the technical details necessary to study cyber security. Topics include binary and hexadecimal, operating systems, hardware and software, networking, memory, storage management and databases.

Prerequisite: Completed college mathematics milestone.

Offered: Fall, Spring.

CSCI 141 – Application and Impact of Artificial Intelligence (4)

Students prepare for success in the AI-driven economy by exploring the transformative power of AI and ethical challenges in business, from personalized customer experiences, healthcare, and manufacturing to autonomous vehicles.

Offered: Fall

CSCI 157 - Introduction to Algorithmic Thinking in Python (4)

This course introduces algorithmic thinking and computer programming in the Python programming language. Topics include algorithms, flowcharts, top-down design, selection, repetition, modularization, input-output, and recursion.

Prerequisite: Completed college mathematics milestone.

Offered: Fall, Spring.

CSCI 209 - Discrete Structures Using Python (4)

Students will explore computer science topics in programming, algorithms, compilers, networks and cryptography. Fundamental mathematical concepts like finite=state machines, recurrence relations, graphs and probability will be applied using Python programs.

Prerequisite: CSCI 157 and MATH 120 or appropriate score on placement exam.

Offered: Fall, Spring.

CSCI 211 - Computer Programming and Design (4)

Fundamentals of problem specification, program design, and algorithm development are taught in the Java programming language. Topics include functions, selection, iteration, recursion, arrays, classes, and inheritance.

Prerequisite: CSCI 157 or consent of department chair.

Offered: Fall, Spring.

CSCI 212W - Data Structures (4)

Abstract data types and data structures are presented. Topics include time complexity, linked lists, stacks, queues, lists, hashing, trees, heaps, searching, sorting, and development of object-oriented programming techniques. This is a Writing in the Discipline (WID) course.

Prerequisite: CSCI 211 or CSCI 221.

Offered: Fall, Spring.

CSCI 302 - C++ Programming (3)

The fundamental concepts and constructs of the C++ programming language are examined. Topics include expressions, input/output, control structures, classes, inheritance, arrays, strings, and templates.

Prerequisite: CSCI 211 or CSCI 221.

Offered: As needed.

CSCI 305 - Functional Programming (4)

Functional programming focuses on the design process from problems to well-organized solutions. Topics include, design recipes, functions, lists, self-referential data structures, recursion, lambda functions, and abstraction with practical applications.

Prerequisite: CSCI 201 or CSCI 211 or equivalent, or consent of department chair.

Offered: As needed.

CSCI 309 - Object-Oriented Design (4)

Students will learn fundamental concepts, techniques and principles in object-oriented analysis and design. Topics include the object-oriented design process, interfaces, inheritance, polymorphism, graphical user interfaces and design patterns.

Prerequisite: CSCI 201 or CSCI 211.

Offered: Fall, Spring.

CSCI 313 - Computer Organization and Architecture (4)

Students investigate combinational and sequential circuits. System architecture including the central processing unit, memory, input/output, MIPS assembly language programming. Input/output and interrupt programming. System performance enhancements including caching and parallelism.

Prerequisite: CSCI 209 or CSCI 312; and CSCI 212 or CSCI 212W.

Offered: Fall, Spring.

CSCI 324 - Dynamic Web Development (4)

Students are introduced to basic concepts, issues, and techniques related to designing, developing, and deploying websites. Technology will include current practice and tools for server-side programming. Programming projects are required.  Students cannot receive credit for both CIS 324 and CSCI 324.

Prerequisite: CSCI 157 or CIS 301, or consent of department chair.

Offered: Fall.

CSCI 325 - Organization of Programming Language (3)

Programming language constructs are presented, with emphasis on the run-time behavior of programs. Topics include language definition, data types and structures, and run-time considerations.

Prerequisite: CSCI 212 or CSCI 212W or CSCI 315.

Offered: Fall (even years), Spring.

CSCI 342W – Social and Ethical Issues in Technology (4)

Students address the social and ethical issues created by the use of computers and other digital technologies and the problems solved by technology. Students discuss their professional ethical responsibilities. This is a Writing in the Discipline (WID) course.

Prerequisite: 45 credit hours or consent of department chair.

Offered: Spring

CSCI 348 – Artificial Intelligence in Gaming (4)

Students explore artificial intelligence techniques and their applications in the gaming industry. Students gain hands-on experience with AI algorithms used for character behavior, procedural content generation, and game design. Hybrid course.

Prerequisite: CSCI 209 or consent of department chair.

Offered: Fall

CSCI 401W - Software Engineering (3)

The software development process is examined from initial requirements analysis to operation and maintenance. Student teams develop a software system from requirements to delivery, using disciplined techniques. This is a Writing in the Discipline (WID) course.

Prerequisite: CSCI 212 or CSCI 212W, or CSCI 309 or CSCI 315, and at least two additional computer science courses at the 300-level or above. or consent of department chair.

Offered: Fall (even years), Spring.

CSCI 402 - Cyber Security Principles (4)

Students will explore topics such as software security, secure programming, network security, cryptography and virtual machines. Students will study cyber security history and the legal discourse surrounding the field.

Prerequisite: CSCI 102 and CSCI 157 or CIS 301; or CSCI 211; and 45 credits; or consent of department chair

Offered: Fall, Spring.

CSCI 410 - Digital Forensics (4)

Students will investigate digital forensic science methods and processes and apply them to the discovery, collection and analysis of evidence. Topics include documenting procedures, securing data and providing expert testimony.

Prerequisite: CSCI 402.

Offered: Fall.

CSCI 415 - Software Testing (4)

Software testing principles, concepts, and techniques are presented within the context of the software development life cycle. Topics include software test design, test process, test management, and software testing tools.

Prerequisite: CSCI 212 or CSCI 212W, or CSCI 315, or consent of department chair.

Offered: Spring.

CSCI 416 - Web Design (4)

Students are introduced to concepts, issues and techniques related to designing website interfaces using a variety of tools. Study includes HTML, CSS, and JavaScript. Students cannot receive credit for both CIS 416 and CSCI 416.

Prerequisite: CSCI 157 or CIS 301.

Offered: Spring.

CSCI 423 - Analysis of Algorithms (4)

Techniques for designing algorithms and analyzing their efficiency are covered. Topics include "big-oh" analysis, divide-and-conquer, greedy method, efficient sorting and searching, graph algorithms, dynamic programming, and NP-completeness.

General Education Category: Advanced Quantatitive/Scientific Reasoning

Prerequisite: CSCI 209 or MATH 436; either CSCI 212 or CSCI 212W, or CSCI 315; and MATH 212.

Offered: Fall (odd years), Spring.

CSCI 427 - Artificial Intelligence Foundations (4)

Students are introduced to foundational artificial intelligence methods, including search, inference, and knowledge representation. Students gain experience with important AI applications, such as natural language processing, computer vision and forecasting. Hybrid course.

Prerequisite: CSCI 212 or CSCI 212W and MATH 240.

Offered: Fall

CSCI 428 – Machine Learning (4)

Students build, train, tune, test, and evaluate common machine learning models. Students apply best practices for responsible ML including identifying, measuring and mitigating issues with bias and fairness.

Prerequisite: CSCI 209, CSCI 427 and MATH 212, or consent of department chair. Hybrid course.

Offered: Spring

CSCI 432 - Network and Systems Security (4)

Students will study a survey of network and systems security topics such as packet analysis, penetration testing and intrusion detection. Students will practice with tools/techniques used by security professionals.

Prerequisite: CSCI 402.

Offered: Spring.

CSCI 435 - Operating Systems (4)

Students explore topics of modern operating systems such as process management and synchronization, CPU scheduling and memory management. Emphasis is placed on increasing OS performance, while enhancing privacy and security.

Prerequisite: CSCI 313 and either CSCI 212, or CSCI 212W, or CSCI 315.

Offered: Fall, Spring (even years).

CSCI 437 - Network Architectures and Programming (4)

An introduction to fundamental concepts of computer networks. Topics include the internet reference model, TCP/IP, flow control, congestion control, routing, switching, network programming, and data capturing and analysis.

Prerequisite: : CSCI 212 or CSCI 212W, or CSCI 315.

Offered: As needed.

CSCI 443 – Natural Language Processing (4)

Students explore human language and translate into a form for machine learning models. Students gain expertise in text analysis, sentiment analysis, chatbots, and more. Hybrid course.

Prerequisite: CSCI 428

Offered: Fall

CSCI 444 – Computer Vision (4)

Students are introduced image processing concepts and learn to manipulate and analyze digital images, extract features from images, and use machine learning to classify and detect objects in images. Hybrid course.

Prerequisite: CSCI 428

Offered: Spring

CSCI 445– Reinforcement Learning and Autonomous Systems (4)

Students are introduced to reinforcement learning in autonomous systems. Students learn to apply reinforcement learning to solve of real-world problems, such as robotics, game playing, and self-driving cars. Hybrid course.

Prerequisite: CSCI 428

Offered: Fall

CSCI 446– Cognitive Robotics (4)

Students explore fundamentals of cognitive robotics, from perception and motion planning to learning and human-robot interaction. Robot prototypes are designed and implemented for real-world business, manufacturing, and assistive applications. Hybrid course.

Prerequisite: CSCI 428

Offered: Spring

CSCI 455 - Introduction to Databases (4)

Students explore the fundamental concepts of database systems. Topics include relational databases, database modeling and design, SQL, query processing and optimization, distributed and noSQL, databases and database security.

Prerequisite: CSCI 212 or CSCI 212W, or CSCI 315.

Offered: Fall.

CSCI 467 - Computer Science Internship (4)

Students work at a business or nonprofit organization integrating classroom study with work-based learning, supervised by a faculty member.

Prerequisite: Major in computer science, minimum GPA of 2.67 in computer science courses, completion of or concurrent enrollment in CSCI 401 or CSCI 401W, and consent of department chair.

Offered: As needed.

CSCI 476 - Advanced Topics in Computer Science (4)

Recent developments and topics of current interest in computer science are studied. This course may be repeated for credit with a change in content.

Prerequisite: CSCI 212 or CSCI 212W, or CSCI 315.

Offered: Spring.

CSCI 490 - Directed Study in Computer Science (1-4)

This course is open to students who have demonstrated superior ability in computer science. Designed to be a substitute for a traditional course under the instruction of a faculty member. This course may be repeated for credit once with a change in content.

Prerequisite: Consent of instructor, department chair and dean.

Offered: As needed.

CSCI 491 - Independent Study in Computer Science (1-4)

This course is open to students who have demonstrated superior ability in computer science. Students select a topic and undertake concentrated research or creative activity mentored by a faculty member. This course may be repeated for credit once with a change in content.

Prerequisite: Consent of instructor, department chair and dean.

Offered: As needed.