COMPUTER SCIENCE (CS)

- General Education Course

CS 101 Coding **1 Credit hour**
This course is designed to expose students to coding with no previous programming experience. The topic covers basic programming with software development methodologies.
Grade Mode: Normal Grading Mode

CS 105 Expl World with Computing (CT) **3 Credit hours**
Central principles and big ideas of computing: problem-solving, computational and critical thinking, abstraction, creativity, reasoning, data, algorithms, recursion, visualization, and limits of computation. Solve real-world problems with computing.
Pre-req: ACT Math with a score of 17 or SAT Verbal Before March 16 with a score of 400 or SAT MATH SECTION SCORE with a score of 440 or Placement Math After SP17 with a score of 101 or MTH 102 with a minimum grade of C or MTH 102B with a minimum grade of C.
Attributes: Critical Thinking
Grade Mode: Normal Grading Mode

CS 110 Computer Science I **3 Credit hours**
Pre-req: ACT Math with a score of 24 or SAT Mathematics Before Mar. 16 with a score of 560 or SAT MATH SECTION SCORE with a score of 580 or MTH 127 or MTH 130 and MTH 132 (may be taken concurrently) or MTH 229 (may be taken concurrently) or MTH 229H (may be taken concurrently).
Concurrent PR: MTH 132 or MTH 229 or MTH 229H
Grade Mode: Normal Grading Mode

CS 110H Computer Science Honors **3 Credit hours**
Object-oriented and algorithmic problem solving principles and techniques; programming with classes in an integrated programming environment; and program debugging.
Pre-req: ACT Math with a score of 24 or SAT Mathematics Before Mar. 16 with a score of 560 or SAT MATH SECTION SCORE with a score of 580 or MTH 127 or MTH 130 and MTH 132 (may be taken concurrently) or MTH 129 (may be taken concurrently) or MTH 129H (may be taken concurrently).
Concurrent PR: MTH 132 or MTH 129 or MTH 129H
Grade Mode: Normal Grading Mode

CS 120 Computer Science II **3 Credit hours**
Object-oriented analysis and design, advanced programming with classes, arrays, strings, sorting, searching, I/O, GUI development, system life cycle and software development methodologies. CR/PR: CS 110
Pre-req: CS 110 or CS 110H.
Grade Mode: Normal Grading Mode

CS 205 Scientific Computing **3 Credit hours**
An introduction to computer programming, software design, and algorithm analysis and implementation. Abstract concepts illustrated with examples and exercises drawn from the mathematical and physical sciences. Primarily for non-CS majors.
Pre-req: MTH 140 or MTH 229 (may be taken concurrently) or MTH 229H (may be taken concurrently).
Concurrent PR: MTH 229 or MTH 229H
Grade Mode: Normal Grading Mode

CS 210 Data Structures and Algorithms **3 Credit hours**
Design and implementation of data structures including stacks, queues, lists, trees, heaps, balanced trees, and graphs. Other topics include hasing, threading, data parsing, program testing, correctness, efficiency, and exceptions. Data structures including stacks, queues, lists, trees, graphs, priority queues, and dictionaries.
Pre-req: CS 120 and MTH 220 (may be taken concurrently).
Concurrent PR: MTH 220
Grade Mode: Normal Grading Mode

CS 215 Adv Data Struct and Algorithms **3 Credit hours**
Advanced techniques for designing and analyzing algorithms, including asymptotic analysis; data structures; divide-and-conquer algorithms and recurrences; greedy algorithms; dynamic programming; graph algorithms; randomized algorithms; and NP-complete problems.
Pre-req: CS 210 and (MTH 229 or MTH 229H) and MTH 220 (may be taken concurrently).
Concurrent PR: MTH 220
Grade Mode: Normal Grading Mode

CS 280 Special Topics **1-4 Credit hours**
EMERGING TOPICS IN COMPUTER SCIENCE.
Grade Mode: Normal Grading Mode

CS 281 Special Topics **1-4 Credit hours**
EMERGING TOPICS IN COMPUTER SCIENCE.
Grade Mode: Normal Grading Mode

CS 282 Special Topics **1-4 Credit hours**
EMERGING TOPICS IN COMPUTER SCIENCE.
Grade Mode: Normal Grading Mode

CS 283 Special Topics **1-4 Credit hours**
EMERGING TOPICS IN COMPUTER SCIENCE.
Grade Mode: Normal Grading Mode

CS 300 Programming Languages **3 Credit hours**
Pre-req: CS 210.
Grade Mode: Normal Grading Mode

CS 305 Software Engineering **3 Credit hours**
This course provides a broad introduction to software engineering theories, methods, and tools. Requires substantial writing. Topics include requirements engineering, analysis and design, implementation, versioning, and testing.
Pre-req: MTH 220 and CS 210 and ENG 354 (may be taken concurrently).
Concurrent PR: ENG 354
Grade Mode: Normal Grading Mode

CS 310 Software Engineering II **3 Credit hours**
Pre-req: CS 305.
Grade Mode: Normal Grading Mode

CS 315 Software Quality Assurance **3 Credit hours**
Testing techniques and validation of system requirements. Design reviews and code inspections; unit, integration, system, regression, load, stress, user acceptance, and regression testing; statistical testing; test strategies and project metrics.
Pre-req: CS 310 and MTH 345.
Grade Mode: Normal Grading Mode

CS 320 Internetworking **3 Credit hours**
Principles and issues in interconnecting multiple physical networks into a coordinated system, operation of internet protocols in the interconnected environment, and design of applications to operate in this environment.
Pre-req: CS 210 and (MTH 229 or MTH 229H).
Grade Mode: Normal Grading Mode

CS 330 Operating Systems **3 Credit hours**
Modern operating systems design and implementation: multi-tasking and time sharing, concurency and synchronization, interprocess communication, resource scheduling, memory management, deadlocks, I/O, file systems, and security.
Pre-req: CS 210.
Grade Mode: Normal Grading Mode

CS 360 Automata and Formal Languages **3 Credit hours**
Basic theoretical concepts are introduced, including finite state automata, regular expressions, context-free grammars, pushdown automata, Turing machines, recursively enumerable languages, the halting problem, and the Church-Turing thesis.
Pre-req: MTH 220 and CS 210.
Grade Mode: Normal Grading Mode

CS 370 Computer Graphics **3 Credit hours**
Mathematical theory and practical tools and techniques for generating realistic pictures using computers. This is a project-centered course and involves extensive programming using the open GL standard.
Pre-req: CS 210 with a minimum grade of D.
Grade Mode: Normal Grading Mode

CS 402 Computer Architecture **3 Credit hours**
Design and analyze structure of major hardware components of computers including: ALU, instruction sets, memory hierarchy, parallelism through multicore and many core, storage systems and interfaces.
Pre-req: CS 300.
Grade Mode: Normal Grading Mode

CS 404 High Performance Computing **3 Credit hours**
Software design and development targeting high performance computing architectures. Multi-core and many-core systems: I/O, file systems, performance metrics. Programming models include MPI, OpenMP, MapReduce, CUDA, OpenCL.
Pre-req: CS 402.
Grade Mode: Normal Grading Mode

CS 405 Computing for Bioinformatics **3 Credit hours**
Study of computational algorithms and programming techniques for various bioinformatics tasks including parsing DNA files, sequence alignments, tree construction, clustering, species identification, principal component analysis, correlations, and gene expression arrays.
Pre-req: CS 215.
Grade Mode: Normal Grading Mode

CS 410 Database Engineering **3 Credit hours**
Study of data models, data description languages, query languages including relational algebra and SQL, logical and physical database design, transactions, backup and recovery. Design and implementation of a database application.
Pre-req: CS 210.
Grade Mode: Normal Grading Mode

CS 412 Embedded Systems **3 Credit hours**
The design of systems containing embedded computers. Micro-controller technology, assembly language and C programming, input/output interfacing, data acquisition hardware, interrupts, and timing. Real-time operating systems and application programming. Application examples.
Pre-req: CS 402.
Grade Mode: Normal Grading Mode

CS 415 Data Mining **3 Credit hours**
Covers (1) the process of knowledge discovery, (2) algorithms (association rules, classification, and clustering), and (3) real-world applications. Focuses on efficient data mining algorithms and scaling up data mining methods.
Pre-req: CS 215 and CS 410.
Grade Mode: Normal Grading Mode

CS 425 Computational Intelligence **3 Credit hours**
Genetic algorithms, evolutionary strategies, and genetic programming. Methods of knowledge representation using rough sets, type-1 fuzzy sets, and type-2 fuzzy sets. Neural network architectures and their learning algorithms.
Pre-req: CS 300.
Grade Mode: Normal Grading Mode

CS 430 Cyber Security **3 Credit hours**
Concepts and issues in physical and cyber security; technological vulnerabilities found in operating systems, database servers, web servers, internet, and local area networks; developing defensive and offensive security measures.
Pre-req: CS 320.
Grade Mode: Normal Grading Mode

CS 435 Cyber Risk **3 Credit hours**
Advanced course on the functions and purposes of the latest development in cyber security techniques and tools used to create, secure, protect and remediate cyber-infrastructures from various cyber threats.
Pre-req: CS 430 or CS 340.
Grade Mode: Normal Grading Mode

CS 440 Digital Image Processing **3 Credit hours**
Mathematical techniques, algorithms, and software tools for image sampling, quantization, coding and compression, enhancement, reconstruction, and analysis.
Pre-req: CS 210 and MTH 329.
Grade Mode: Normal Grading Mode

CS 452 Natural Language Processing **3 Credit hours**
Fundamental algorithms and computational models for core tasks in natural language processing: word and sentence tokenization, parsing, information and meaning extraction, spelling correction, text summarization, question answering, and sentiment analysis.
Pre-req: (CS 215 and MTH 220).
Grade Mode: Normal Grading Mode

CS 455 Systems Engineering **3 Credit hours**
Tools and techniques for optimizing the design and construction of software-intensive systems by considering system issues and making engineering tradeoffs in conflicting criteria and interacting decision parameters.
Pre-req: CS 330 and CS 340 and CS 350.
Grade Mode: Normal Grading Mode

CS 475 Internship **3-12 Credit hours**
An in-depth and hands-on involvement in a real-world project under direct professional supervision. The project may be on-campus or off-campus. Requires prior apporval of the internship director, who is a member of the computer science faculty.
Pre-req: CS 300 or CS 215.
Grade Mode: Credit/No Credit Grade Only

CS 480 Special Topics **1-4 Credit hours**
EMERGING TOPICS IN COMPUTER SCIENCE.
Grade Mode: Normal Grading Mode

CS 481 Special Topics **1-4 Credit hours**
EMERGING TOPICS IN COMPUTER SCIENCE.
Grade Mode: Normal Grading Mode

CS 482 Special Topics **1-4 Credit hours**
EMERGING TOPICS IN COMPUTER SCIENCE.
Grade Mode: Normal Grading Mode

CS 483 Special Topics **1-4 Credit hours**
EMERGING TOPICS IN COMPUTER SCIENCE.
Grade Mode: Normal Grading Mode

CS 485 Independent Study **1-4 Credit hours**
EMERGING TOPICS IN COMPUTER SCIENCE.
Grade Mode: Normal Grading Mode

CS 486 Independent Study **1-4 Credit hours**
EMERGING TOPICS IN COMPUTER SCIENCE.
Grade Mode: Normal Grading Mode

CS 487 Independent Study **1-4 Credit hours**
EMERGING TOPICS IN COMPUTER SCIENCE.
Grade Mode: Normal Grading Mode

CS 488 Independent Study **1-4 Credit hours**
EMERGING TOPICS IN COMPUTER SCIENCE
Grade Mode: Normal Grading Mode

CS 490 Senior Project **3 Credit hours**
Application of technical and professional skills in solving a real-world problem in a team environment. Discuss professional code of conduct, societal issues, and transition from student to industry professional.
Pre-req: CS 310 and CS 410.
Attributes: Capstone Course
Grade Mode: Normal Grading Mode

CS 491 Senior Project II **3 Credit hours**
Senior capstone experience. Application of technical and professional skills in constructing and testing a real-world problem in a team environment.
Pre-req: CS 490.
Grade Mode: Normal Grading Mode