COMPUTER SCIENCE (CPSC)

CPSC 106 - Digital Storytelling (3 Credits)
Students explore how technology has changed the way we publish and disseminate narratives including the roles of digital text, audio, video, and images in narrative. Students use technology including blogs, virtual worlds, and computer games to create and tell their own stories. Cross-listed as DGST 106.

CPSC 110 - Introduction to Computer Science (3 Credits)
This course provides a foundation in computer science for a student who does not have prior programming experience. It provides sufficient support to permit a student to continue in the major program. Topics include an introduction to the algorithm and program development process using a high-level structured programming language and the department's computing facilities. Supervised hands-on experience provided. May not be taken for graded credit after passing any Computer Science course numbered 220 or higher.

CPSC 220 - Computer Programming and Problem Solving (4 Credits)
Continued coverage of problem-solving and algorithmic development. Topics include data structures such as arrays, files, and classes. Study of program design, coding, debugging, testing, and documentation in an object-oriented programming language. This course is intended for students with previous programming experience. Others are advised to take CPSC 110 instead.

CPSC 225 - Software Development Tools (1 Credits)
Prerequisite: CPSC 220, or DATA 219. This course provides a practical introduction to using common software developments tools. Topics will include using the Unix command line, files and permissions, managing processes, the vim text editor, version control, and writing shell scripts.

CPSC 240 - Object-oriented Analysis and Design (4 Credits)
Prerequisite: CPSC 220 (grade of C or better). Theory and practice of the object-oriented software development paradigm including encapsulation, visibility, inheritance, polymorphism, and design patterns. Includes an introduction to modeling notations and further development of testing skills. Also covers issues in software development including communication, code sharing, diversity, inclusion. Students collaboratively develop software in teams using an object-oriented language.

CPSC 284 - Applied Discrete Mathematics (4 Credits)
Designed to prepare majors for advanced study by emphasizing the components of discrete mathematics especially related to computer science and emphasizing applications to technology. Topics include logic, proofs, sets, relations, functions, vectors, matrices, structures, and other topics at the instructor's discretion. This course assumes prior programming experience. Others should take CPSC 110 before enrolling in this class.

CPSC 302 - Computer Ethics (3 Credits)
Prerequisite: CPSC 110 or 220. An examination of issues and events related to ethics, professional conduct and social responsibility as they apply to the field of Computer Science. Includes study of ethical responsibilities and behaviors appropriate for computer scientists.

CPSC 305 - Computer Systems and Architecture (4 Credits)
Prerequisites: CPSC 225, a grade of C or better in CPSC 240, and either CPSC 284 or MATH 201. This course examines the basic operation of computing systems. It takes a bottom-up approach covering each major component of such systems including hardware, logic circuit design, CPU instruction sets, assemblers, and compilers. Students will gain experience programming in assembly language and C.

CPSC 318 - System and Network Administration (4 Credits)
Prerequisite: CPSC 225. A hands-on course on the fundamentals of system and network administration with a focus on proper design and management for ensuring system and network security.

CPSC 326 - Theoretical Foundations of Computing (4 Credits)
Prerequisites: CPSC 240 and either CPSC 284 or MATH 201. Covers structures and concepts relating to the underlying theory of computation and mathematical models of actual physical processes. Also covers a repertoire of advanced algorithms for data processing, and the asymptotic analysis of those algorithms to describe their running time and space requirements. Topics may include formal languages, automata theory, Turing machines, the halting problem, NP completeness, searching and traversal algorithms, dynamic programming, compression algorithms, and random number generation.

CPSC 335 - C++ Programming (1 Credits)
Prerequisite: CPSC 225, CPSC 240. This course will teach students problem-solving skills using the C++ programming language. Programming fundamentals include variables, control statements, loops, arrays, pointers, functions, and object-oriented programming.

CPSC 340 - Data Structures and Algorithms (4 Credits)
Prerequisite: CPSC 225, a grade of C or better in CPSC 240, and either CPSC 284 or MATH 201. Continued study of data modeling and incorporation of abstract data types including linked lists, stacks, queues, heaps, trees, and graphs. Study of advanced sorting and searching techniques. Provides experience in the use of algorithm analysis. Continued study of program design, coding, debugging, testing, and documentation in an object-oriented higher level language.

CPSC 350 - Applications of Databases (4 Credits)
Prerequisite: CPSC 225, and grade of C or better in CPSC 240 or DATA 219. Presents basic techniques for the design and implementation of database-driven web applications. Topics include the design of relational and NoSQL databases and scaling techniques such as the use of load balancing and distributed systems. Programming intensive using a dynamic high-level general-purpose language. Cross-listed as DATA 350.

CPSC 370 - Special Topics in Computer Science (1-4 Credits)
Treatment of selected topics in Computer Science. May be repeated for credit with a change in topic.

CPSC 391 - Special Projects in Computer Science (1-4 Credits)
Prerequisite: Permission of the instructor. Intensive individual investigation of significant research problem under the direction of a faculty member. GPA and course prerequisites apply.

CPSC 401 - Organization of Programming Languages (3 Credits)
Prerequisite: CPSC 240. Covers the design and implementation of programming languages including lexical and syntax analysis, interpretation, and translation with a focus on the realization of high-level language features. Also introduces alternative programming models such as functional and logic.

CPSC 405 - Operating Systems and Systems Programming (4 Credits)
Prerequisites: CPSC 305 and CPSC 340. This course examines the abstractions above the hardware that make a computer usable to both programmers and users. These abstractions include processes, context switching, concurrent programming, semaphores, virtual addressing, transactions, access control, and virtualization. Many of these abstractions are the foundation for operating systems kernel development. The abstractions are also applicable to any large-scale programming project. Programming intensive.

CPSC 414 - Network Principles & Application (3 Credits)
Prerequisite: CPSC 225 and CPSC 240. This course provides an introduction to the basic principles of networking. Topics covered in the course include: network topologies, protocols, the OSI Model, methods of data transmission, error detection and correction, TCP/IP, network security and other topics as time permits. This course is theoretical and concept oriented rather than consisting of the details of specific network packages.

CPSC 415 - Artificial Intelligence (3 Credits)
Prerequisites: CPSC 240 and either CPSC 284 or MATH 201. A survey of current artificial intelligence topics including informed search, knowledge representation, knowledge-based systems, and machine learning. Other topics such as image processing, robotics, and language processing, may also be covered. Artificial intelligence programming projects are required.

CPSC 419 - Data Mining (3 Credits)
Prerequisite: DATA 219 or CPSC 220. Practical knowledge of data mining, machine learning, and information retrieval. Students will examine the theoretical foundations of a variety of techniques, gain experience with these techniques using open source software, and learn how to apply them to solve real-world problems. Topics include decision trees, Naïve Bayes, probabilistic retrieval models, clustering, support vector machines, approaches to web mining, and scalable machine learning applications. Cross-listed as DATA 419.

CPSC 420 - Modeling & Simulation (3 Credits)
Prerequisite: DATA 219 or CPSC 220. A robust introduction to techniques of mathematical modeling and computational simulation applied to practical problems. Topics include system dynamics approaches, discrete-event simulation, and agent-based models. Students complete small projects on topics as diverse as population growth, epidemic transmission, queuing theory, and forest fire outbreaks.

CPSC 425 - Parallel Computing (3 Credits)
Prerequisite: CPSC 305. This course provides an introduction to parallel computing, covering topics including parallel architectures, programming techniques and libraries, the study of existing parallel computing systems, and performance analysis. Students will use a variety of hardware to explore current libraries and methods used for parallel programming.

CPSC 430 - Software Engineering (4 Credits)
Prerequisite: CPSC 340 and 350. Techniques for modeling, designing, implementing, and managing large-scale computer programs are studied. Studies include software process models, modeling using UML, and application development with a CASE tool. Continued study of issues in collaborative software development including communication, code sharing, diversity and inclusion. Students work in groups and apply the techniques studied to semester-long projects.

CPSC 440 - Game Programming (3 Credits)
Prerequisite: CPSC 240. Student will design, develop, and implement computer games that involve real-time, event-driven, and multimedia programming techniques. Students learn the history of computer games and the elements of video game design and architecture.

CPSC 444 - 3D Computer Graphics (3 Credits)
Prerequisite: CPSC 240 and CPSC 284. The study of three-dimensional modeling involving the use of light, color, texture and transformation; visible surface detection; parallel and perspective projections; clipping algorithms.

CPSC 448 - Advanced Web Application Development (3 Credits)
Prerequisite: CPSC 350. An examination and application of contemporary software technologies focused on providing Web-based services and applications. Special emphasis on distributed systems that have cooperating client-side and server-side components.

CPSC 458 - Network Security (3 Credits)
Prerequisite: CYBR 345. Explores advanced network security topics and provides hands-on practice. Topics covered include, but are not limited to, network vulnerabilities, virtual LANs, firewall, access control, network anomaly detection and intrusion prevention, advanced network security algorithms and protocols, penetration test, network risk management, and security of the Internet of Things. Cross-listed as CYBR 458.

CPSC 460 - Human-Computer Interaction (3 Credits)
Prerequisite: CPSC 220. Basic principles, theory and practice of human-computer interaction as an interdisciplinary field. User-oriented perspective with a focus on the design and evaluation of interfaces and the communication between humans and technology.

CPSC 470 - Advanced Special Topics in Computer Science (1-4 Credits)
Prerequisite: Specified by Instructor. Treatment of selected topics in Computer Science. May be repeated for credit with a change in topic.

CPSC 491 - Individual Study in Computer Science (1-4 Credits)
Individual study under the direction of a member of the department. Minimum GPA and course prerequisites apply. May be repeated for credit with a change in topic. Two semesters of 3-credits of study required for graduation with Departmental Honors.

CPSC 492 - Individual Study (1-3 Credits)
Individual study under the direction of a member of the department. Minimum GPA and course prerequisites apply. May be repeated for credit with a change in topic. Two semesters of 3-credits of study required for graduation with Departmental Honors.

CPSC 499 - Internship (1-12 Credits)
Supervised off-campus experience, developed in consultation with the department. Only 3 credits may count toward the major and minimum gpa and course prerequisites apply.