CSC 099/Orientation to Computer Science   **0 course unit**
(Fall)
An introduction to the computer science program with a focus on the discipline, including an investigation of computing ethics. Students familiarize themselves with departmental procedures, standards, staff and faculty. An introduction to mentored research and internship experiences engages the first-year student in the culture and expectations of the department and of the discipline. Students develop an appreciation for the services offered by the College and for the resources available within the department and across campus.

CSC 101/Introduction to Interactive Computing   **1 course unit**
(same as IMM 120)
(every semester)
A first course in computing languages for interactive multimedia. Students are introduced to the art of programming through state-of-the-art multimedia technologies (e.g., Macromedia Studio MX). Through intensive laboratory experience students learn the programming fundamentals (e.g., variables, functions, control structures and logic, persistent storage and networking). Problems related to interactivity are emphasized (e.g., through assignments based on HTML and Flash coding). Students will understand the distinction between mark up languages, scripting languages and general purpose programming languages and develop proficiency in the first two. Persistent storage and networking concepts are introduced through high-level applications (e.g., Macromedia Studio). Efficiency, data structure organization and objects are introduced within the context of interactive computing problem solving. This course may not be taken by computer science majors without permission of the department, and then only for free elective credit.

CSC 102/Introduction to Computational Modeling   **1 course unit**
(occasionally)
Students model various social and other complex problems and analyze them using multiple computer simulation programs. Students also modify existing programs and implement simple custom modules so that they can analyze the problems of their choice. Through this process students are expected to learn the principles behind computational modeling which would let them see real-world problems in a precise and concise manner. This course may not be taken by computer science majors without permission of the department, and then only for free elective credit.

CSC 104/Human and Artificial Intelligence   **1 course unit**
(spring)
In this course, students focus on both, human and artificial intelligence as a means of improving one's own use of intellect. Various mathematical and computational mechanisms behind intelligence are explored and analytical and logical reasoning skills are put into practice. Logical and probabilistic analysis, the two main themes behind the mathematical/computational mechanisms are looked into. Students use logical formulae to model particular aspects of human intelligence, e.g., communication and reasoning. They also use probabilistic methods to model decision making under uncertainty as well as certain aspects of learning.

CSC 105/Applying Computing to Mathematical Problem Solving   **1 course unit**
(occasionally)
Requisite: Reserved for non-Computer Science students
Problem specification, problem-solving techniques, goals and sub goals, search, repetition, algorithm description, elements of pseudo code, high-level computer languages and their use and implementation. This course may not be taken by computer science majors without permission of the department, and then only for free elective credit.

CSC 215/Computer Science I for Science and Engineering   **1 course unit**
(every semester)

A first course in computer science for science, mathematics, and engineering science majors. Emphasis is on using computational methods to solve scientific problems. The programming languages C/C++ or Fortran will be used to teach structured programming and algorithm development. Topics include control structures, data typing including structures and arrays, parameterized procedures, and recursion as well as simple I/O control. This course may not be taken by computer science majors without permission of the department, and then only for free elective credit.

CSC 220/Computer Science I: Computational Problem Solving   **1 course unit**
(every semester)
A first course in computer science for computer science majors in which students learn to express algorithmic ideas in an abstract manner. An object-oriented language such as Java will be introduced; however, the emphasis is on algorithmic design and implementation rather than language mechanics. Students will become intimately familiar with expressing mathematical ideas as programs.

CSC 230/Computer Science II: Data Structures   **1 course unit**
(every semester)
Prerequisites: CSC 220
A second course in computer science in which students learn how the algorithms and structures studied in CMSC 220 are implemented on a sequential machine. Classic data structures (lists, queues, stacks, trees, and tables) and algorithms (searching and sorting) are considered, but the emphasis is on analysis. First analysis of implementation techniques is addressed by studying the trade-offs between static and dynamic structures. Second analysis of complexity of algorithms is studied first informally and then using formal proof techniques. The implementation of the object-oriented paradigm is also shown via Java.

CSC 250/Accelerated CS I, II   **1 course unit**
(annually)
Prerequisite: Permission of the department ; CSC 215 and permission of the department is a prerequisite for Engineering students
A first, intensive course in computer science for students with demonstrated extensive experience programming, or those who have placed above a standard set by the department on the Computer Science AP exam. The course is also for students with some computer science background but with gaps in their knowledge of the standard CS I/CS II curriculum. Additionally, it is for students who took CS I/CS II courses elsewhere but have no experience programming in the programming language or paradigm that supports the CS I/CS II sequence. The course covers the material of CSC 220 (CS I) and CSC 230 (CS II) in one semester. The basic introduction to programming of CSC 220 is considered a review, while the emphasis on problem solving and solution design is presented within the context of a thorough grounding in the classic data structures using the modern object-oriented framework. The course contains section placements for both computer science and computer engineering students.
NOTE: Students (majors or minors) who take CSC 250 must complete an additional CS option course or receive Advanced Placement credit.

CSC 260/Computer Science III   **1 course unit**
(every semester)
Prerequisite: CSC 230 or CSC 250 both with a minimum grade of C
The emphasis of this course is on learning and applying the principles of the design and development of software systems involving numerous interacting data types. Students are expected to work in a large collaborative group, which either receives a proposal and specifications for a software system from an outside client or produces their own. Integration, testing, and enhancements of the system begin at the prototype level and move incrementally to full integration. Documentation and product presentation are expected.

CSC 307/Data Mining and Predictive Modeling   **1 course unit**

(spring)
Prerequisites: STA 215 and BIO 352 or CSC 320
An introduction to Data Mining and Predictive Modeling. Topics include decision trees, link functions, logic regression, neural networks, TreeNet, support vector machine, text mining, association rules (market basket analysis), and link analysis.

CSC 310/Discrete Structures of Computer Science   1 course unit
(every semester)
Prerequisite: Sophomore standing
Concepts and structures fundamental to computer science. Declarative programming techniques will be used to explore discrete structures. Topics will include logic, relations, functions, word algebras, induction, and recursion.

CSC 315/Database Systems   1 course unit
(spring)
Prerequisite: CSC 230 with a minimum grade of C
This course introduces the student to abstracts of well-known database systems and the design and implementation of a database system using a relational database package.

CSC 320/Information Retrieval   1 course unit
(same as IMM 320)
(fall)
Prerequisites: For CS students or other majors: CSC 230 with a grade of C or higher. For IMM students: IMM core with a grade of C or higher
The course discusses theory and practice of searching and retrieval of information. Topics covered include automated indexing, statistical and linguistic models, text classification, Boolean and probabilistic approaches to indexing, query formulation and output ranking, information routing and filtering, topic detection and tracking, as well as measures of retrieval effectiveness, including relevance, utility, miss/false-alarm. Techniques for enhancing retrieval effectiveness including relevance feedback, query reformulation, thesauri, concept extraction, and automated summarization. Experimental retrieval approaches from relevant state-of-the-art conferences (TREC) as well as modern Internet search engines are discussed in detail.

CSC 325/Computer Architecture   1 course unit
(every semester)
Prerequisites: CSC 230 and CSC 310 both with a grade of C or higher
Introduces the architecture of a general-purpose computer by considering its structure at the hardware and software levels through the instruction set. Project-oriented course that stresses design and implementation of the processor of a computer. Introduces design and simulation of logic circuits, combinational and sequential, the design of the instruction set for a von Neumann architecture and the writing of programs in an assembly language for such a machine. Topics include combinational logic design; finite state machines; instruction set architectures; elements of computer organization; RTL; processor and hardware control unit design; computer arithmetic and ALU design; memory subsystem and cache design; reduced instruction sets; and I/O interfaces.

CSC 345/Operating Systems   1 course unit
(every semester)
Prerequisites: CSC 260 with a minimum grade of C and CSC 325
Operating systems theory and implementation, examining the operating system as an interface between the application program and computer hardware. OS services for memory, processor, file, and device management are examined. Study of resource management implemented by an operating system in a multiprogramming environment. Case studies include system software design and implementation highlighting standard operating systems such as Unix, Linux, and Windows.

CSC 350/ Computer Graphics   **1 course unit**
(fall)
Prerequisites: CSC 260 and CSC 310, both with a grade of C or higher
An introduction to the fundamentals underlying the design of computer graphics software that is platform independent. Takes an algorithmic approach to the study of graphic operations required to create a complex scene and mixes it with a study of the properties of hardware elements used in generating a graphic. The modeling and transformation process is stressed. Topics include 2-D graphic elements and transformations; viewing and clipping; hierarchical modeling; 3-D concepts and objects; solid geometry; 3-D transformations and the viewing pipeline; visible surface detection; and lighting models.

CSC 360/Computer Networking   **1 course unit**
(fall)
Prerequisites: CSC 260 with a grade of C or higher
This course introduces basic elements of modern computer and telecommunication networks. A hybrid five-layer reference model resembling the popular TCP/IP model is discussed. In each layer, the state-of-the-art hardware and software technologies are introduced. These include: fiber-optic and mobile/cellular communications; HTTP/WEB; wavelength/time division multiple access protocols; TCP/UDP and ATM adaptation layer protocols; network security.

CSC 365/Games I: Design and Architecture   **1 course unit**
(annually)
Prerequisites: CSC 260 or IMM 270
This is a multidisciplinary course that invites students from a variety of disciplines to participate in the development of a game design while learning about the underlying architecture of a game engine. Students will customize a broad set of learning goals to their own needs, ranging from the purely artistic to the purely technical. Lecture and workshops will provide a full range of exposure to game development including game engine design, story telling, interactivity, networking for multi-user, 3-D pipeline for games, sound, music and dialog. Each semester will focus on a particular type of game, including but not limited to "Role playing:, "First person shooter", "Immersive Learning, " "Real world simulation." Students will also address issues of gender and racial equity in the games industry as will as social, ethical and health concerns.

CSC 380/Artificial Intelligence   **1 course unit**
(spring)
Prerequisites: CSC 230 with a grade of C or higher; or permission of the instructor
The study of how to make the computer behave intelligently. Topics: state-space methods of problem solving, heuristic search techniques, representation and use of knowledge, applications and design of expert systems, natural language processing, vision and image understanding. Design of specifications for intelligent agents is discussed at length and a high level implementation is developed in First Order Logic, LISP, Prolog, or any of the current AI languages.

CSC 390/Programming Languages   **1 course unit**
(occasionally)
Prerequisites: CSC 260 and CSC 310, both with a grade of C or higher
This course covers alternatives to the imperative procedural programming paradigm. Included are object-oriented, functional, and logic programming. The emphasis is on language design, use, and implementation.

CSC 391/Independent Study in Computer Science   **variable course units (0.3 – 1)**
(every semester)

Prerequisite: By invitation only, with permission of the department
Student studies independently an appropriate area. A faculty adviser and a project description must be agreed upon before registering for this course.

CSC 399/Internship in Computer Science   **1 course unit**
(every semester)
Prerequisites: Permission of department and college specified minimum GPA
A supervised computer-related field experience in industrial, governmental, or private sector. Faculty supervisor advises the student where to focus the learning objective for the given internship. A project at the internship is to be the level of research in junior/senior independent study topics in computer science. Grading is a letter grade. Paper and public lecture required.

CSC 410/Advanced Analysis of Algorithms   **1 course unit**
(fall)
Prerequisites: CSC 260 and CSC 310, both with a grade of C or higher
This course presents the major principles of algorithm design and analysis, and applies those principles to classical problems in computer science. Topics include complexity, advanced ADTs, searching and sorting, graph search and traversal, dynamic programming, cryptography, theoretical computer science, operations on polynomials and matrices, and pattern matching. As a capstone experience, students participate in a mini-colloquium covering the course topics.

CSC 434/Compilers and Interpreters   **1 course unit**
(every other fall alternating with CSC 460)
Prerequisites: CSC 260 and CSC 310, both with a grade of C or higher
This course balances the theory and practice, by applying theoretical principles within a software project. Topics: formal language theory, regular expressions, finite state automata, Backus-Naur form grammars, formal and informal specification of semantics. Lexical analysis, parsing, scope analysis, type checking, and code generation. Issues of programming language design. Following an attribute grammar specification, students implement a compiler for an object-oriented language.

CSC 460/Theory of Computation   **1 course unit**
(every other fall alternating with CSC 434)
Prerequisites: CSC 260 and CSC 310, both with a grade of C or higher
This course focuses on the traditional, algorithmic theory of computation consisting of three subareas: (1) computability, (2) complexity theory, and (3) formal languages and automata. The topics include: Turing machines, decidability/undecidability, reducibility, Church-Turing thesis, context-free grammars/languages, push-down automata, finite automata, regular expressions/languages, and time/space complexity including NP-completeness.

CSC 465/Games II: Implementation and Project Management   **1 course unit**
(annually)
Prerequisites: CSC 365 or IMM365; or permission of the instructor
This is a multidisciplinary course that invites students from a variety of disciplines to participate in the implementation of a robust demonstration video game. Programmers, software engineers, digital artists, sound specialists and musicians work collaboratively to create a single game (designed in Games I). Each student defines a personal role in the process so that no two students will complete the same set of course requirements. All students however participate in learning about and implementing a project management structure to plan and execute the sequence of activities that must take place to complete the game. Each semester will focus on a particular type of game, including but not limited to "Role playing". "First person shooter", "Immersive Learning", "Real world simulation." Students will also address issues of gender and racial equity in the games industry as well as social, ethical and health concerns.

CSC 470/Topics in Computer Science   **1 course unit**

(every semester)
Prerequisites: CSC 260 and CSC 310, both with a grade of C or higher
Study of an advanced topic in computer science chosen by the instructor. Normally taken by junior or senior computer science majors, this course may be elected several times, as long as the topics differ.

CSC 471/Genomics and Bioinformatics   **1 course unit**
(spring)
(same as BIO 470 when the topic is Genomics and Bioinfomatics)
Prerequisites: BIO 185 and CSC 230
This course will cover theoretical and practical components of genomics and bioinformatics. The major topics will include mapping and sequencing genomes, sequence alignment of nucleic acids and proteins, haplotype maps, analysis of complex traits, parallel profiling of gene expression, proteomics, phylogenetic analysis, and data mining. The laboratory will begin with the *in silico* analysis of gene families, continue to the formulation of a testable hypothesis about gene function, writing a mini-grant for peer review, testing of the hypothesis in a model organism, and conclude with a formal presentation of the data generated during the semester. This course is best suited for undergraduates who wish to continue with a career in basic science or biomedical research.

CSC 498/Mentored Research I in Computer Science   **1 course unit**
(every semester)
Prerequisites: CSC 260 and minimum 2.5 GPA
Intensive study of an advanced topic in computer science under the supervision of a faculty mentor. Emphasizes student activity, use of journals and monographs, discussions, solution and presentations of problems. This course culminates in the writing of a journal-style paper and the presentation of a public lecture.

CSC 499/Mentored Research II in Computer Science   **1 course unit**
(every semester)
Prerequisites: CSC 498 and minimum 2.5 GPA
For continuing projects begun in CSC 498.