COMPUTER SCIENCE (CS)

CS 108 Found of Computer Science I 3 sem. hrs.
An introduction to computers, basic coding, hardware, software and applications to help students better understand the basic concepts and underlying principles of Computer Science. Offered every fall.

CS 111 Intro to Obj-Oriented Program 3 sem. hrs.
Introduction to programming in an object-oriented language. Early work will emphasize procedural programming techniques - introducing students to data types, input-output operations, decision statements, loops, and arrays. Students will then study construction of simple user-defined classes. Offered every spring.
Prerequisite: MATH 103 with a grade of C or above.

CS 112 Introduction to Networking 3 sem. hrs.
Students will study the elements of a computer network including the base framework and infrastructure, concepts of operation, installation, and configuration of the hardware and operating system software. Students will acquire hands-on experience from actual setup and configuration in a network lab environment. Offered every fall.

CS 114 Introduction to Cybersecurity 3 sem. hrs.
This course introduces the fundamental concepts of computer and network security, cyber-attacks, and cyber-defense. Students will examine the legal aspects of cybercrime and investigate standards and best practices for mitigating circumstances. Offered every spring.
Prerequisites: CS 112

CS 120 Introduction to Bioinformatics 3 sem. hrs.
Bioinformatics is the application of computer power to problems in Biology and medicine. This course provides an introduction to the problems addressed by the cross-disciplinary field of bioinformatics, and to some of the tools made available by this technology. Students will use bioinformatics to investigate genome organization, gene structure, and the four levels of protein structure. Students are introduced to molecular visualization tools, sequence analysis software, and on-linesequence comparison tools. A short paper is required, investigating aparticular gene, its product, the structure of the product, and its function in the cell. Three one-hour lectures per week. Cross-listed as BIO 120. Offered every fall.

CS 199 Special Topics 3 sem. hrs.
To fill special student needs or take advantage of a visiting professor or serve as an experimental offering of a contemplated regular course. May be repeated as new topics are presented.

CS 201 Visual Basic I 3 sem. hrs.
Develop Graphic User Interfaces and add event-driven code to create and/or run simple applications from the Windows environment, using VISUAL BASIC. Understand and use forms, controls, properties, modules. Learn proper Windows design and design considerations. This is largely a hands-on course. Offered every fall semester.
Prerequisite: Familiarity with the use of Windows, plus CS111 or one semester of college computer programming, or permission of the instructor.

CS 205 Python Programming 3 sem. hrs.
This course introduces programming fundamentals using Python language. Students develop algorithms, use control structures, functions, and file-handling, and explore object-oriented concepts. Emphasis is placed on writing clear, well-developed code and solving real-world problems in science, business, and cybersecurity. Prerequiste: None

CS 210 Understanding UNIX/LINUX 3 sem. hrs.
Introduction to the UNIX/LINUX operating systems will be conducted using a laboratory environment. Students explore the components of the UNIX/Linux operating system, working with basic commands and applications.
Prerequisite: CS 111.

CS 212 Intro Object-Oriented Prg II 3 sem. hrs.
Further work with user-defined classes as well as data structures such as array lists and linked lists, searching and sorting techniques, simple text file handling, generic methods and classes and recursion. Offered every fall semester.
Prerequisite: CS 111 with a grade of C or above; MATH 104 with a grade of C or better.

CS 220 Discrete Patterns for Comp Sci 3 sem. hrs.
Investigation of Discrete Patterns that are especially relevant to Computer Science including Boolean logic, propositions, induction and recursion, counting techniques, discrete probability.
Prerequisite: MATH 155 with grade of C or above.

CS 221 Database Techniques 3 sem. hrs.
This course provides an in-depth exploration of database management systems, with a focus on relational database technologies and techniques. Students will gain a comprehensive understanding of relational database design, implementation, querying, and administration. The course covers advanced topics in database theory, modeling, SQL programming, and optimization for relational databases.
Prerequisite: CS 111 or permission of instructor.

CS 231 Discrete Patterns II 3 sem. hrs.
(See MATH 230-231) Algorithms and Combinatorics. Logic, circuits, Karnaugh maps. Proofs, including quantified statements and mathematical induction. Relations, graphs, trees. Languages and finite-state machines. Offered as needed.
Prerequisite: CS 230.

CS 251 Web Publishing 3 sem. hrs.
Introduction to the Internet, World Wide Web, HTML, and web page authoring. Web page construction using web authoring tools will include: frames, graphics, sound and animation. Appropriate design and copyright issues will be addressed. Offered every spring semester.

CS 280 Bioinformatics Seminar 1 sem. hr.
A one-credit course in which on-line genome databases will be explored. The course culminates with a project inquiring into some aspect of cell biology, drawing on bioinformatics tools made available by various databases, such as the human genome browsers at NCBI, EMBL, and UCSD, the OMIM and OMIA databases, and gene expression data from EST and microarray databases. Cross-listed as BIO 280. Offered every spring.
Prerequisites: BIO101, 102.

CS 298 Computer Sci Career Seminar I 1 sem. hr.
This introductory seminar focuses on helping beginning computer science students from all three majors gain valuable time with professionals in the field, through seminars presentations and at conferences meant to expose students to career options in CS. Offered every spring semester.

CS 299 Special Topics 3 sem. hrs.
To fill special student needs or take advantage of a visiting professor or serve as an experimental offering of a contemplated regular course. May be repeated as new topics are presented. Requires permission of Director of Computer Science. Offered as needed.

CS 303 Introduction to Data Science 3 sem. hrs.
This course examines the issues of big data and data analytics. The aim is to bring students, with basic programming and data structure background, to be abreast with common tools used for Data Science application development. This course serves as an introduction to the basics of data science including programming for data analytics, file management, relational databases, classification, clustering and regression. The foundation is laid for big data applications ranging from social networks to medical and business informatics. Offered every fall semester.

CS 306 Computer Organization 3 sem. hrs.
Investigation of the computer as hierarchy of levels-digital logic; microprogramming; machine; assembly language, operating systems. Includes lab work in assembly language. Offered every fall semester.
Prerequisite: CS 111 with grade of C or above.

CS 307 Advanced Python Programming 3 sem. hrs.
This course builds on foundational Python programming skills and introduces advanced concepts and techniques used in professional software development. Topics include object-oriented design, modular application architecture, working with databases, client-server programming, RESTful APIs, data serialization (JSON), and asynchronous or concurrent programming. Emphasis is placed on designing maintainable, scalable applications and applying best practices in modern Python development. Prerequistes: CS 201 (oe equivalent) and CS 221.

CS 314 Functional Programming 3 sem. hrs.
Concepts, structures, methods and applications appropriate to the Functional Paradigm (Currently Haskell). Offered every fall semester of even-numbered years.
Prerequisites: CS 111 with grade of C or above, or permission of instructor.

CS 335 LINUX/UNIX Programming 3 sem. hrs.
Study of the LINUX/UNIX programming environments.
Prerequisite: CS 212 with grade of C or above.

CS 385 Computer Science Internship 1-12 sem. hrs.
Interns receive practical learning experience outside the academic setting. Requires permission of the Director of Computer Science and agreement of the relevant authority on the employer's side. Student may enroll in this course more than once but only 6 total hours may count towards the major. Offered by arrangement.

CS 387 Advanced Cybersecurity 3 sem. hrs.
This course examines advanced concepts of computer and network security, cyber-attacks, and cyber-defense. Students will examine in depth the fundamental concepts of cybersecurity from the introductory course, CS 114. The course will also further investigate standards and best practices in cybersecurity. Offered fall semester. Prerequisite: CS 114, CS 210, CS 251

CS 399 Special Topics 1 sem. hr.
To fill special student needs or take advantage of a visiting professor or serve as an experimental offering of a contemplated regular course. May be repeated as new topics are presented.

CS 402 Modular Projects 3 sem. hrs.
Students will undertake a semester-long, real-life programming project while gaining expertise in the C language. Individual or group projects depending on the composition of the class and the interests of the students. Offered as needed.
Prerequisite: CS 311 or with grade of C or above.

CS 403 Object Oriented Prog w/C++ 3 sem. hrs.
Object-oriented programming using the C++ language. Topics include abstract data types, polymorphism and overloading. Assumes familiarity and comfort with C programming language. Course begins with investigation of differences between C and C++; proceeds into object-oriented programming in C++. Includes work with the Standard Template Library (STL). Offered as needed.
Prerequisite: CS 402 with grade of C or above or ability to program in C and permission of instructor.

CS 404 Prin of Computer Languages 3 sem. hrs.
Comparative study of key programming languages in view of design concepts and seminal implementation methods. Introduction to LISP or similar language with lab exercises. Not currently offered.
Prerequisites: CS 306 and CS 311 with grade of C or above.

CS 405 Operating Systems 3 sem. hrs.
Investigation of the principles of a modern computer operating system. Topics include processes, memory management, input/output, file systems. Examples will be taken from current operating systems such as Windows, LINUX/UNIX. Offered as needed.
Prerequisites: CS 306 and CS 402 with grade of C or above.

CS 420 Bioinformatics Applications 3 sem. hrs.
In this course we will learn to use many of the tools of bioinformatics, including genome database, BLAST searcher, DNA analysis software, and protein structure modeling. Biology majors will complete a project which relates to one of their upper-level biology classes. CS students will complete a project involving programming or another CS activity. Cross-listed as BIO 420. Offered every fall.
Prerequisites: for biology majors, BIO 101-102 along with one of BIO 306, BIO 403, or BIO 307/CHEM 307; for CS majors, junior or senior students who have completed at least 2 programming courses.

CS 425 Software Engineering I 3 sem. hrs.
This course blends theory with practical application. Today's information systems are built using both a structured and object-oriented approaches. Therefore, students will be "dual-tracked", ensuring exposure to both methodologies. CS 425 focuses on the definition, analysis, and design stages of systems development. Students will apply theoretical concepts through practice using case studies. Projects will be completed both on an individual basis and in a collaborative team environment. Offered every fall.
Prerequisite: CS 212 with a grade of C or better; CS 221 with a grade of C or better.

CS 426 Software Engineering II 3 sem. hrs.
This course is intended to provide the students an opportunity to continue their study into the various approaches to information systems design and analysis processes, including Object-Oriented Analysis and Design (OOAD) and Unified Modeling Language (UML). In addition, the students will be required to complete a major project, created specifically to apply their knowledge at a practical level. Emphasis will be placed on the participatory nature of systems design and implementation and will require active contributions by the students during and outside of the official class times. The individual and group-based projects, started in CS 425 will be completed during this class. Emphasis will be placed in the design, development, and implementation of systems within a variety of contexts. Offered every spring.
Prerequisite: CS 425.

CS 490 Independent Study/Research 3 sem. hrs.
Course by arrangement.

CS 498 CS Career Seminar II 1 sem. hr.
This capstone experiences focuses on helping advanced computer science students from all three majors gain valuable time with professionals in the field, through seminars presentations and at conferences. Offered every spring.