Who is Computer Science at Chico State?

Computer Science at Chico State is defined by its faculty, students, and alumni.

We are Faculty

We faculty in the Department of Computer Science feel strongly about being actively involved in your education. Our classes are taught by us, the faculty, not by assistants. We are also constantly assessing and updating our curriculum to ensure it reflects not only the "science" underlying computer science, but also the current and emerging technologies that our computer science and computer information systems graduates develop and use. This drive for currency is reflected in our research in areas such as security, data science, computer vision, robotics, bioinformatics, and quantum computing. We invite you to contact us, come for a visit, and apply. We love what we do. Let us to share our enthusiasm with you and help you discover the same passion we and our students share for computer science.

We are Students

We students are not nameless faces in a classroom. Computer science professors develop a more personal relationship with us. And the assigned projects have character; they are remarkably effective at demystifying computer technology. We also know that the portrayal of computer science as a solitary endeavor pursued by social misfits is entirely wrong. At Chico State we have found computer science to be a uniquely human experience. Engineering software is the effort of many people working together, solving large, difficult, captivating problems. Social interaction embodies the student culture here at Chico State.

And the support—help is everywhere. Student tutors are available most times during the day and faculty office hours are plentiful. Study groups are the norm, and there are numerous clubs to join. The most remarkable aspect of being a student in Chico State's Computer Science Department is how friendly and sociable everyone is. Everyone wants you to succeed. We students spend a lot of time with each other. We work well together and are establishing lasting friendships. We even created our own Computer Science Discord server where someone is always available to help when working through difficult material.

We are Alumni

We alumni find ourselves returning to the Computer Science Department from which we graduated. We come to hire the new graduates into the companies we now work for, knowing they have the same preparation that put us on a path to success. We serve on the department's Industry Advisory Board, ensuring the program’s continued strength and relevance. We even visit the student's Discord server to reminisce and provide real opportunity that I am thankful for. As well as what I hope are lifelong friends, in both faculty and alumni.” —Stephen Anderson (Computer Science, '21)

"I got a FAANG internship during my rising senior summer. With my practical experience from Chico State classes and professors I was able to execute well during my internship and received a full-time return offer. After some experience at my first company, I used my class assignments to prep for another FAANG company, which I was given an offer that I took. I consistently stack up and over-perform against fellows from Ivy Leagues and other tech colleges, and all of this from a college that I was able to graduate from without taking out loans.” —James Krepelka (Computer Science, '15)

1 FAANG: prominent technology companies Facebook, Amazon, Apple, Netflix, and Google

Programs

Undergraduate

Bachelor's
No results were found.

Minors
No results were found.

Certificates
No results were found.

Graduate

Master's
No results were found.

See Course Description Symbols and Terms (https://catalog.csuchico.edu/academic-standards-policies/course-description-symbols-terms/) for an explanation of course description terminology and symbols, the course number system, and course credit units.

Computer Information Systems

CINS 220 PCs and Peripherals 3 Units
Typically Offered: Fall and spring
This course focuses on the hardware and software of the modern PC, currently available peripherals and upgrades, and the basics of networking. Included will be a survey of the pros and cons of different hardware choices for various PCs, peripherals, and networking options. 2 hours activity, 2 hours discussion. (002337)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Lower Division

CINS 242 Information Systems Design 3 Units
Prerequisite: CSCI 111 with a grade of C or higher.
Typically Offered: Fall only
Systems analysis and design, and the role of Information Systems in organizations. Emphasis is on the project-team design approach. Operational criteria, system feasibility, requirements, and cost trade-offs. Integration of personnel, equipment, hardware, and software. 3 hours discussion. (002377)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Lower Division
CINS 370  Introduction to Databases  3 Units
Prerequisite: CSCI 211; CSCI 217 or MATH 217, both with a grade of C or higher.
Typically Offered: Fall and spring
This course provides an introduction to the theory and methodology for database design and implementation. Topics may include a survey/lecture component as well as a project component. The survey component covers entity-relationship modeling, relational algebra and calculus theories, data definition and data manipulation languages such as SQL, file structures, transactions, concurrency control, recovery, tuning and optimization, and object-oriented databases. The project entails requirements definition, design, and implementation of a database application. 2 hours activity, 2 hours discussion.  (002338)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division

CINS 448  Cybersecurity  3 Units
Prerequisite: CSCI 211 and CINS 220, CSCI 221 or EECE 237, all with a grade of C or higher; or Classified Computer Science Graduate Standing.
Typically Offered: Fall and spring
In line with the National Institute of Standards and Technology (NIST) National Initiative for Cybersecurity Education (NICE) cybersecurity workforce, this course offers a blend of theoretical knowledge and hands-on lab experiences across nine key cybersecurity domains: open source intelligence, cryptography, password cracking, log analysis, network traffic analysis, forensics, web application exploitation, scanning, and enumeration and exploration. The course also readsies students for CompTIA Security+ examination. 3 hours lecture.  (020232)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division; Laptop required

CINS 465  Web Programming Fundamentals  3 Units
Prerequisite: CINS 370 with a grade of C or higher, CSCI 211 and MINS 335, or MINS 325 and MINS 335; or Classified Computer Science Graduate Standing.
Typically Offered: Fall and spring
A hands-on project course that examines languages, tools, protocols, and techniques for developing interactive and dynamic web applications. Topics include the model-view-controller pattern, document object model, server side and client side scripting, using a server side database, and web applications security. The course includes several web projects using a web programming framework. 3 hours discussion.  (002368)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division; Laptop required

CINS 467  Web and Mobile App Development  3 Units
Prerequisite: CINS 370 with a grade of C or higher, CSCI 211 and MINS 335, or MINS 325 and MINS 335; or Classified Computer Science Graduate Standing.
Typically Offered: Fall and spring
A hands-on project course that examines languages, tools, protocols, and techniques for developing robust client-side applications for mobile and web apps. Topics include the model-view-controller, cloud service integration, REST, Progressive Web Apps, app publishing, and application security. The course includes several projects using across-platform programming framework. 3 hours discussion.  (002365)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division; Laptop required

CINS 490  Computer Information Systems Capstone  3 Units
Prerequisite: CSCI 311 with a grade of C or higher; CINS 465 or CINS 467 with a grade C or higher; Senior Standing.
Typically Offered: Fall and spring
This capstone course provides a culminating activity in computer information systems. Students work independently to specify, design, develop, test, and document a complete information systems application under faculty supervision. Students present status reports at weekly meetings, and present their finished project at the end of the semester. 9 hours supervision.  (020996)
Grade Basis: Report in Progress: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division

CINS 548  Digital Forensics  3 Units
Prerequisite: CINS 448 with a grade of C or higher or Classified Computer Science Graduate Standing.
Typically Offered: Fall only
This course provides an understanding of foundational terms, concepts, elements, and the overarching goals that drive a digital forensic investigation. Topics include how to utilize and analyze data with leading open-source digital forensic tools, conduct comprehensive disk and file system analysis, examine and interpret operating system and associated artifacts, evaluate various internet artifacts including browser histories and email data, and analyze files to construct incident timelines based on forensic evidence. This course includes several real-world challenges. 3 hours lecture.  (020234)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division; Laptop required

CINS 570  Advanced Database Management Systems  3 Units
Prerequisite: CINS 370 with a grade of C or higher, MINS 335, or Classified Computer Science Graduate Standing.
Typically Offered: Fall only
Course topics include database application programming using a high performance, high concurrency multi-user database management system. This course covers the SQL programming language including Data Definition Language, Data Manipulation Language, and Data Control Language. The course then focuses on a procedural database programming language including control structures, composite datatypes, explicit cursors, exception handling, and writing embedded SQL applications. 2 hours activity, 2 hours discussion.  (002381)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division

Computer Science
CSCI 101  Introduction to Computer Science  3 Units
Typically Offered: Fall and spring
Students who have had limited experience with computers should take CSCI 101 before CSCI 111. CSCI 101 provides an overview of the fundamentals of computer science. Number systems and data representation are introduced. An overview of hardware, including the control unit, memory, the ALU, and I/O is provided. Software is introduced with an overview of operating systems, programming languages, applications, and software tools. Students are exposed to common operating systems and applications. Student also design and implement several programs. 2 hours activity, 2 hours discussion.  (002280)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Lower Division
CSCI 102 Living With Technology 3 Units GE
Typically Offered: Fall and spring
This course explores the impact of technology on our lives. Aspects of our complex technological society are investigated through study of the various forms technology takes, and readings in contemporary literature regarding the impact these technologies have on individuals. Students are encouraged to reflect on technology in their own lives through journaling, and to discourse with their peers on the benefits and harm to individuals, society, and humanity that modern technology presents. 3 hours discussion. (020623)
General Education: Lifelong Learning and Self-Development (E)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Lower Division; Sustainable Course

CSCI 111 Programming and Algorithms I 4 Units
Prerequisite: GE Mathematics/Quantitative Reasoning (B4) requirement, completion of high school precalculus, or meet requirements for enrollment in MATH 120. Recommended Co-enrollment: CSCI 217/ MATH 217 (take concurrently).
Typically Offered: Fall and spring
A first-semester programming course, providing an overview of computer systems and an introduction to problem solving and software design using procedural object-oriented programming languages. Coverage includes the software life cycle, as well as algorithms and their role in software design. Students are expected to design, implement, and test a number of programs. 2 hours activity, 3 hours lecture. (002281)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 4 units
Course Attributes: Lower Division; Laptop required

CSCI 198 Special Topics 1-3 Units
Prerequisite: Department permission.
Typically Offered: Fall and spring
This course is for special topics offered for 1.0-3.0 units. Typically the topic is offered on a one-time-only basis and may vary from term to term and be different for different sections. See the Class Schedule for the specific topic being offered. 3 hours supervision. (002307)
Grade Basis: Graded
Repeatability: You may take this course more than once
Course Attributes: Lower Division

CSCI 199 Special Problems 1-3 Units
Prerequisite: Faculty permission.
Typically Offered: Fall and spring
This course is a special topic offered for 1.0-3.0 units. You must register directly with a supervising faculty member. 0 hours supervision. (021848)
Grade Basis: Credit/No Credit
Repeatability: You may take this course for a maximum of 6 units
Course Attributes: Lower Division

CSCI 211 Programming and Algorithms II 4 Units
Prerequisite: GE Mathematics/Quantitative Reasoning (B4) requirement; CSCI 111 with a grade of C or higher. Recommended: CSCI 217 or MATH 217 (may be taken concurrently).
Typically Offered: Fall and spring
A second semester object-oriented programming course in computer science that emphasizes problem solving. This course continues the study of software specification, design, implementation, and debugging techniques while introducing abstract data types, fundamental data structures and associated algorithms. Coverage includes dynamic memory, file I/O, linked lists, stacks, queues, trees, recursion, and an introduction to the complexity of algorithms. Students are expected to design, implement, test, and analyze a number of programs. 2 hours activity, 3 hours lecture. (002282)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 4 units
Course Attributes: Lower Division

CSCI 217 Discrete Mathematics 3 Units
Prerequisite: GE Mathematics/Quantitative Reasoning Ready, CSCI 111 with a grade of C or higher (may be taken concurrently), MATH 119 (or equivalent).
Typically Offered: Fall and spring
Offers an intensive introduction to discrete mathematics as used in computer science. Topics include sets, relations, propositional and predicate logic, basic proof methods including mathematical induction, digital logic circuits, complexity of algorithms, elementary combinatorics, and solving linear recurrence relations. 3 hours discussion. (005550)
Cross listing(s): MATH 217
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Lower Division

CSCI 221 Assembly Language Programming 3 Units
Prerequisite: CSCI 211 with a grade of C or higher. CSCI 217 or MATH 217 recommended.
Typically Offered: Inquire at department
Topics include number systems and their rules for arithmetic; basic central processing unit (CPU) organization concepts such as registers, data paths, the arithmetic and logic unit (ALU) and the interface to random access memory (RAM); instruction formats, addressing modes and their uses with a variety of data structures; and parameter passing techniques including the use of a stack frame. The use of good programming methodologies to develop and document algorithms at the assembly language level is emphasized. 2 hours activity, 2 hours lecture. (002290)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Lower Division
CSCI 300 Computer Science Seminar
Prerequisite: CSCI 211 with a grade of C or higher.
Typically Offered: Fall and spring
This course exposes students to computer science topics not normally covered in the computer science curriculum. Guest speakers include faculty (including from other departments), students, alumni, and members of the computing industry. Topics include current computer science research and software development issues. Specific topics may include software development tools, bioinformatics, human computer interaction, security, machine learning, specific corporate approaches to software development, dev-ops, software job interviews, programming languages, simulation, graphics, game development, web and mobile applications, cloud computing, and networks. 1 hour lecture. (021889)
Grade Basis: Credit/No Credit
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division

CSCI 301W Computer's Impact on Society (W)
Prerequisite: GE Written Communication (A2) requirement; Junior standing.
Typically Offered: Fall and spring
Impact of computers and high-tech systems on people, institutions, organizations, and environment. Examines the following: law, medicine, education, government, data banks, privacy, computer security, changing work, automation, robots, expert systems, AI, social responsibility, ethics, war, conflict resolution. Includes weekly reading, midterm, and final writing projects. Weekly lectures, discussions, films, and writing. No programming. 3 hours discussion. (002309)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division; Writing Course; Graduation Writing Assessment

CSCI 310 Programming Foundations
Prerequisite: Graduate Standing.
Typically Offered: Fall only
An accelerated object-oriented programming course that prepares students without sufficient undergraduate preparation for the graduate program in computer science. Coverage includes software specification, design, implementation, debugging techniques, dynamic memory, I/O, linked lists, stacks, queues, recursion, trees, search structures, hashing, heaps, sorting algorithms, graph algorithms, and an introduction to the complexity of algorithms. Foundational data structures and algorithms are studied and analyzed using both mathematical and empirical measurements. The course includes a number of large programming assignments focusing on object-oriented software engineering and algorithm development. 2 hours activity, 5 hours discussion. (022021)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 6 units
Course Attributes: Upper Division

CSCI 311 Algorithms and Data Structures
Prerequisite: CSCI 211 with a grade of C or higher; CSCI 217 or MATH 217 with a grade of C or higher.
Typically Offered: Fall and spring
This course focuses on object-oriented methodologies in designing and implementing a variety of data structures and algorithms. Coverage includes recursion, trees, search structures, hashing, heaps, sorting algorithms, and graph algorithms. Data structure and algorithm combinations will be studied and analyzed along with their relative merits using both mathematical and empirical measurements. The course includes a number of large programming assignments focusing on object-oriented software engineering and algorithm development. Students will be required to design, implement, test, and analyze their programs in at least one object-oriented language. 2 hours activity, 3 hours lecture. (002325)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 4 units
Course Attributes: Upper Division

CSCI 315 Programming Languages
Prerequisite: CSCI 311 with a grade of C or higher.
Typically Offered: Spring only
An investigation into the structure and syntax of current programming languages, including binding, scoping, data types, transfer-of-control structures, subprograms, abstract data types, object-oriented programming, and logical and functional programming. 3 hours discussion. (002323)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division

CSCI 344 Shell Programming
Prerequisite: CSCI 211 with a grade of C or higher; CSCI 217 or MATH 217 with a grade of C or higher.
Typically Offered: Spring only
This course examines the tools that allow software engineers to automate frequently performed operations and workflows, manipulate text and data, and develop software more quickly and easily than compiled languages. Shell programming in BASH or a similar shell, text processing languages such as sed and awk, and a scripting language such as Python or Ruby are covered. This course is recommended for students pursing careers in software development and/or information systems. 2 hours activity, 2 hours discussion. (002330)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division

CSCI 345 Linux System Administration
Prerequisite: CSCI 211 with a grade of C or higher; CSCI 217 or MATH 217 with a grade of C or higher.
Typically Offered: Fall only
This course guides students through the fundamentals of Linux system administration. Topics include an exploration of the Linux Standard Base, user account and file system management, process and service management, operating system installation and configuration, and virtual and cloud environments. 2 hours activity, 2 hours discussion. (002372)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division
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<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
<th>Prerequisites</th>
<th>Typically Offered</th>
<th>Course Attributes</th>
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<td>CSCI 385</td>
<td>Introduction to Data Science</td>
<td>3</td>
<td>CSCI 111, MATH 130, or MATH 230; MATH 109 or MATH 120.</td>
<td>Fall only</td>
<td>Upper Division</td>
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<td>CSCI 389</td>
<td>Industry Internship</td>
<td>1-3</td>
<td>Department permission.</td>
<td>Fall and spring</td>
<td>Upper Division; Laptop required</td>
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<td>CSCI 398</td>
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<td>CSCI 399</td>
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<td>CSCI 411</td>
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<td>3</td>
<td>CSCI 311 with a grade of C or higher.</td>
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<td>CSCI 415</td>
<td>Theory of Computation</td>
<td>3</td>
<td>CSCI 311 with a grade of C or higher.</td>
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<td>CSCI 417</td>
<td>Applied Linear Algebra for Computer Science</td>
<td>3</td>
<td>CAGD 280, CSCI 211, or MECH 208 each with a grade of C or higher; or classified graduate standing.</td>
<td>Spring only</td>
<td>Upper Division</td>
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<td>CSCI 430</td>
<td>Software Engineering</td>
<td>3</td>
<td>CSCI 311 with a grade of C or higher.</td>
<td>Fall and spring</td>
<td>Upper Division</td>
</tr>
</tbody>
</table>
CSCI 431W Usability Engineering (W)  3 Units  GE, W
Prerequisite: GE Oral Communication (A1); GE Written Communication (A2); GE Critical Thinking (A3); GE Mathematics/Quantitative Reasoning (B4) requirements, or consent of the instructor.
Typically Offered: Fall and spring
Usability Engineering is the craft of designing and evaluating how people interact with products and technology. In this course, students learn qualitative and quantitative methods for conducting behavioral research to investigate human-computer interaction (HCI) and to iteratively improve user experience (UX) design of digital interfaces. Students engage in team projects and conduct user research to design, evaluate and revise interactive prototypes following the user-centered design process. 2 hours activity, 2 hours discussion.  (020615)
General Education: Upper-Division Social Sciences (UDD); Innovation, Design, and the Arts Pathway
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division; Laptop required; Writing Course

CSCI 440 Operating Systems  4 Units
Prerequisite: CSCI 221 or EECE 237; CSCI 311 all with a grade of C or higher.
Typically Offered: Fall and spring
Operating system fundamentals, including history, process and thread management, concurrency with semaphores and monitors, deadlocks, storage management, file systems, I/O, and distributed systems. 2 hours activity, 3 hours discussion.  (002328)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 4 units
Course Attributes: Upper Division

CSCI 446 Introduction to Computer Networks and Network Management  3 Units
Prerequisite: CSCI 211; CINS 220, CSCI 221, or EECE 237 all with a grade of C or higher.
Typically Offered: Fall and spring
This course is an introduction to basic networking technologies and network management concepts, including major network operating systems, communication architecture focusing on ISO and Internet models with discussion of current standards and protocols, and applications of probability and statistics in computer networking. Significant laboratory work using current networking equipment reinforces lectures and provides fundamental experience with router and switch management. 3 hours laboratory, 2 hours lecture.  (002340)
Cross listing(s): EECE 446
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division

CSCI 485 Advanced Topics in Data Science  3 Units
Prerequisite: CSCI 385 or MATH 385; MATH 456 (may be taken concurrently).
Typically Offered: Spring only
Getting connected to current events in Data Science and building an online presence. Ethics of predictive analytics and privacy and open data. Reporting and dissemination of research using interactive dashboards and web-publishing. Introduction to current scalable technologies to handle Big Data. Introduction to advanced statistical analysis and machine learning techniques for Data Science. 3 hours lecture.  (021890)
Cross listing(s): MATH 485
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division

CSCI 490 Computer Science Capstone  3 Units
Prerequisite: CSCI 430; CINS 465, CINS 467, or MATH 485; Senior Standing.
Typically Offered: Fall and spring
This capstone course provides a culminating activity in computer science. Students will work independently to specify, design, develop, test, and document a complete software application under faculty supervision. Students present status reports at weekly meetings, and present their finished project at the end of the semester. 9 hours supervision.  (002343)
Grade Basis: Report in Progress: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division

CSCI 498 Topics in Computer Science  1-3 Units
Typically Offered: Inquire at department
This course is a special topic offered for 1.0-3.0 units. Exploration of selected topics in Computer Science. Consult semester schedules for specific listings. Standard letter grading only. 3 hours discussion.  (002389)
Grade Basis: Graded
Repeatability: You may take this course more than once
Course Attributes: Upper Division

CSCI 499 Special Problems  1-3 Units
Prerequisite: Faculty permission.
Typically Offered: Fall and spring
This course is an independent study of special problems offered for 1.0-3.0 units. You must register directly with a supervising faculty member. 3 hours supervision.  (002390)
Grade Basis: Credit/No Credit
Repeatability: You may take this course for a maximum of 6 units
Course Attributes: Upper Division

CSCI 499H Honors Research Project/Thesis  3 Units
Prerequisite: Acceptance into Honors in the Major program.
Typically Offered: Fall and spring
Open by invitation to computer science majors with a GPA of 3.5 or higher in the major. This Honors in the Major course focuses on the development of a creative research project in computer science, its presentation, discussion of relevant research materials, and the reporting of findings. 9 hours supervision.  (002391)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division
CSCI 511 Advanced Object-Oriented Programming 3 Units
Prerequisite: CSCI 311 with a grade of C or higher.
Typically Offered: Fall only
This course is dedicated to the analysis, design, and implementation of programming problems using an object-oriented approach. Modern object-oriented languages are utilized. Topics include inheritance, the underlying implementation of polymorphism, exception handling, extending existing system libraries, and approaching algorithm development from an object-oriented perspective. 3 hours lecture. (002356)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division

CSCI 511H Object-Oriented Programming - Honors 3 Units
Prerequisite: CSCI 311 with a grade of C or higher; acceptance into Honors in the Major program.
Typically Offered: Fall only
Honors version of CSCI 511. In addition to completing all course requirements for CSCI 511, the student is required to research a topic related to Object-Oriented Programming, and propose an independent study to be completed during the following semester. A written research report and proposal is required. A grade of B or higher in this course is necessary in order to use it to earn the Honors in the Major distinction. 3 hours discussion. (020790)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division

CSCI 515 Compiler Design 3 Units
Prerequisite: CSCI 311 with a grade of C or higher.
Typically Offered: Fall and spring
The elements of lexical, syntactical, and semantic analysis including finite and push-down automata, top-down and bottom-up parsing, error detection and recovery, semantic actions and code generation. 3 hours discussion. (002369)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division

CSCI 515H Compiler Design - Honors 3 Units
Prerequisite: CSCI 311 with a grade of C or higher; acceptance into Honors in the Major Program.
Typically Offered: Fall and spring
The elements of lexical, syntactical, and semantic analysis including finite and push-down automata, top-down and bottom-up parsing, error detection and recovery, semantic actions, and code generation. Honors students enrolled in this course are required to implement a significant additional feature in the semester project and to develop an approved proposal in the area of languages/compilers for their Honors Research Project/Thesis. 3 hours discussion. (020185)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division

CSCI 520 Applied Quantum Computing for Computer Scientists 3 Units
Prerequisite: CSCI 311 with a grade of C or higher; MATH 109, MATH 120, or MATH 315; or Classified Computer Science Graduate Standing.
Typically Offered: Spring only
This course introduces the practice of quantum computation and algorithms in computer science. Topics covered include the mathematics to understand the relationship between physical systems and quantum computation. Algorithms to be implemented include Deutsch’s mapped function algorithm, Grover’s search algorithm, Simon’s periodicity algorithm, and Shor’s prime factorization algorithm. Other concepts include quantum error correction, and quantum cryptography. Students will develop their code on a quantum computer. 2 hours activity, 2 hours lecture. (022275)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division; Laptop required

CSCI 540 Systems Programming 3 Units
Prerequisite: CSCI 440 with a grade of C or higher.
Typically Offered: Fall only
A hands-on project course that examines the development of systems software. It provides an introduction to writing low level programs in the UNIX/Linux environment. Topics include using system calls, processes, threads, concurrency, process/thread synchronization, signals, and interprocess communication. The course includes several large programming projects which provide students solid experience in lower level programming. 3 hours discussion. (002378)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division

CSCI 546 Network Forensics 3 Units
Prerequisite: CSCI 446, EECE 446, or MINS 346 with a grade of C or higher.
Typically Offered: Spring only
This course provides an in-depth understanding of the principles and techniques used in network forensic, including the collection, preservation, analysis, and presentation of digital evidence from network-based incidents. The course covers the role of network forensic in incident response and cybercrime investigations. Students learn about the various tools and techniques used in network forensic including network capture, traffic analysis, and log analysis. Students gain hands-on experiences using these tools through various labs and case studies. 3 hours laboratory, 2 hours lecture. (002382)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division; Laptop required

CSCI 551 Numerical Methods and Parallel Programming 4 Units
Prerequisite: CSCI 440 with a grade of C or higher; MATH 109 or MATH 120; or Classified Computer Science Graduate Standing.
Typically Offered: Fall and spring
Surveys numerical methods and parallel programming. Parallel architectures and algorithms for scientific programming applications, solution of simultaneous linear and non-linear equations, iterative techniques, matrix methods, and error analysis. Development of parallel algorithms, with a focus on efficient implementation and performance. 2 hours activity, 3 hours lecture. (002332)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 4 units
Course Attributes: Upper Division; Laptop required
CSCI 565 Advanced Web and Mobile App Development 3 Units
Prerequisite: CINS 467 with a grade C or higher.
Typically Offered: Spring only
A hands-on project course that examines languages, tools, protocols, and techniques for developing robust server-side interfaces and how to integrate them into cross-platform apps. Topics include the model-view-controller pattern, server-side scripting, using a server-side database, REST, the gRPC remote procedure call framework, web applications security, and hosting robustness. The course includes several projects using a web programming framework and integration into cross-platform client-side apps. 3 hours lecture. (022409)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division; Laptop required

CSCI 566 Computer Graphics Programming 3 Units
Prerequisite: CSCI 311 with a grade of C or higher.
Typically Offered: Fall only
This course covers algorithms and data structures in computer graphics. Topics include output primitives and their attributes, 2-D and 3-D geometric transformations and viewing, 3-D object modeling, parallel and perspective projections, visible surface detection, illumination models, and rendering algorithms. 3 hours discussion. (002363)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division

CSCI 580 Artificial Intelligence 3 Units
Prerequisite: CSCI 311 with a grade of C or higher.
Typically Offered: Fall and spring
This course introduces the basic principles, techniques, and applications of artificial intelligence. This course is organized in three sections: search, logic, and learning. Topics include but are not limited to problem-solving, heuristic search, genetic algorithm, game-playing, constraint-satisfaction problems, propositional and predicate logic, knowledge representation, feed-forward neural networks, and decision trees. Students implement and analyze artificial intelligence algorithms. 3 hours discussion. (002360)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division

CSCI 580H Artificial Intelligence - Honors 3 Units
Prerequisite: CSCI 311 with a grade of C or higher, acceptance into Honors in the Major program.
Typically Offered: Fall and spring
An introduction to the basic principles, techniques, and applications of Artificial Intelligence. Coverage includes knowledge representation, logic, inference, problem solving, search algorithms, game theory, perception, learning, planning, and agent design. Students program with AI language tools. Additional areas may include expert systems, machine learning, natural language processing, and computer vision. Honors students enrolled in this course are held to more rigorous standards and expectations in both assignments, participation, and examination than students in CSCI 580. They are also expected to perform preliminary work for the follow-up course, typically in the form of a literature review and proposal. 3 hours discussion. (021882)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division

CSCI 581 Machine Learning 3 Units
Prerequisite: CSCI 311 with a grade of C or higher; MATH 109 or MATH 120; or Classified Computer Science Graduate Standing.
Typically Offered: Fall and spring
This course introduces students to the concepts, theories, and experimental methods of machine learning. This course develops a broad understanding of the issues in implementing machine learning algorithms and systems, especially as they relate to modern data-intensive problems. Topics include but are not limited to experimental design, supervised learning (linear and non-linear regression, parametric and nonparametric learning, support vector machines, Bayesian networks, Hidden Markov Models, and advanced neural networks), unsupervised learning (clustering, dimensionality reduction, and kernel methods), ensemble approaches, learning theory, and reinforcement learning. Students implement and analyze machine learning algorithms. 3 hours discussion. (022009)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division; Laptop required

CSCI 581H Machine Learning- Honors 3 Units
Prerequisite: CSCI 311 with a grade of C or higher.
Typically Offered: Fall and spring
This course introduces students to the concepts, theories, and experimental methods of machine learning. This course develops a broad understanding of the issues in implementing machine learning algorithms and systems, especially as they relate to modern data-intensive problems. Topics include but are not limited to experimental design, supervised learning (linear and non-linear regression, parametric and nonparametric learning, support vector machines, Bayesian networks, Hidden Markov Models, and advanced neural networks), unsupervised learning (clustering, dimensionality reduction, and kernel methods), ensemble approaches, learning theory, and reinforcement learning. Students implement and analyze machine learning algorithms. Honor students enrolled in this course are held to more rigorous standards and expectations in assignments, participation, and examinations than students in CSCI 581. Students are also expected to perform preliminary work for the follow-up course, typically in the form of a literature review and proposal. 3 hours discussion. (022108)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division

CSCI 582 Bioinformatics 3 Units
Prerequisite: CSCI 311 with a grade of C or higher; MATH 105, MATH 314, or MATH 350 (may be taken concurrently).
Typically Offered: Spring only
An introduction to computational methods for Next Generation Sequencing data analysis. Topics include mapping sequenced reads back to a reference genome; approximate string matching; intro to biostatistics; probability distribution, hypothesis testing; identification of SNPs (single polymorphisms); analysis of RNA-seq data; mapping RNA-seq reads, identification of splice-junctions, analysis of gene expression; genome-wide associated analysis of methylation and gene expression. 3 hours discussion. (021619)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division
CSCI 585  Robotics and Machine Intelligence  3 Units
Prerequisite: CSCI 211, EECE 237 both with a grade of C or higher; MATH 109 or MATH 120; or Classified Computer Science Graduate Standing.
Typically Offered: Spring only
This course introduces students to the field of robotics by emphasizing the use of software to model, task, localize, navigate, and control mobile and manipulator robot systems. Topics include various case studies of robot architectures and algorithms that facilitate teleoperation, automation, and levels of autonomous tasking and intelligent operation (e.g., sensor fusion, perception, reactive reasoning, intelligent navigation, vision, machine learning, etc.). Students develop and/or configure software for a robot system by researching and experimenting with hardware, robot operating systems and simulation tools. ECC compliant laptop required. 2 hours activity, 2 hours lecture. (002361)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division; Laptop required

CSCI 598  Adv Topic in Computer Science  1-4 Units
Typically Offered: Inquire at department
This course is a special topic offered for 1.0-4.0 units. Exploration of selected topics in Computer Science. Consult semester schedules for specific listings. Standard letter grading only. 0 hours discussion. (020184)
Grade Basis: Graded
Repeatability: You may take this course more than once
Course Attributes: Upper Division

CSCI 605  Data Structures and Algorithms for Data Science  3 Units
Prerequisite: Basic Python programming knowledge; admission to the master's program in Data Science and Analytics, or faculty permission.
Typically Offered: Fall and spring
This course focuses on object-oriented methodologies in designing and implementing a variety of data structures and algorithms using the Python programming language. Coverage includes recursion, trees, search structures, hashing, heaps, sorting algorithms, and graph algorithms. Particular attention will be given to studying the relative merits of these data structures under different conditions both mathematically and through empirical measurement as they are used in the field of data science. 3 hours discussion. (022532)
Grade Basis: Graduate Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Graduate Division; Laptop required

CSCI 608  Data Science for Graduate Studies  3 Units
Prerequisite: Basic programming knowledge, admission to the master's program in Data Science and Analytics or Computer Science, or faculty permission.
Typically Offered: Fall only
This course covers foundational practices of data science emphasizing reproducibility and ethical practices at all stages of the data science lifecycle. Recent advances and seminal works in data science and related fields will be discussed and scientific communication best practices will be addressed. Topics include version control, scientific thinking, web scraping, intermediate data wrangling, data visualization, modeling, prediction, classification, and text analysis in either R or Python. 3 hours discussion. (022535)
Cross listing(s): MATH 608
Grade Basis: Graduate Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Graduate Division; Laptop required

CSCI 611  Applied Machine Learning  3 Units
Prerequisite: CSCI 311 and classified graduate standing.
Typically Offered: Spring only
The course offers a practical exploration into machine learning and cutting-edge topics in neural networks, including modern techniques for deep learning. Students build deep learning models using sophisticated machine learning frameworks and scientific libraries. 3 hours lecture. (002395)
Grade Basis: Graduate Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Graduate Division

CSCI 612  Applied Computer Vision  3 Units
Prerequisite: CSCI 311 or equivalent with C or higher.
Typically Offered: Spring only
Applied computer vision used in automation, robotics, physical security, surveillance, and inspection applications and systems. Topics covered include theory of computer vision and related algorithms for image capture and processing, filtering, thresholds, edge detection, shape analysis, shape detection, salient object detection, pattern matching, digital image enhancement, stereo ranging, and methods of sensor and information fusion. Focus is on real-time continuous image processing from cameras and video. Application using multi-core and co-processing parallel computing systems are covered as they relate to scaling of computer vision applications. 2 hours activity, 2 hours discussion. (022279)
Grade Basis: Graduate Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Graduate Division; Laptop required

CSCI 620  Web Technology  3 Units
Prerequisite: CINS 467 with a grade of C or higher, or web programming experience, and classified graduate standing.
Typically Offered: Fall only
This course examines frameworks, libraries, languages, and tools for the development of full stack web applications that are progressive, responsive, and secure. Student propose, design, develop, test, and present a nontrivial full stack web application. 3 hours seminar. (002436)
Grade Basis: Graduate Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Graduate Division; Laptop required

CSCI 630  Software Design and Maintenance  3 Units
Prerequisite: Classified Computer Science Graduate Standing.
Typically Offered: Spring only
Students conduct a study of designing and maintaining complex software. The course builds upon fundamental software engineering skills with an emphasis on: object-oriented software design patterns, anti-patterns, code review and refactoring, and tools for evaluating code quality. Students practice maintaining software by collaborating on a large-scale open source project using automated development operation (DevOps) tools. 3 hours discussion. (002394)
Grade Basis: Graduate Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Graduate Division; Laptop required
<table>
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
<th>Prerequisite</th>
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<th>Grade Basis</th>
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<td>CSCI 640</td>
<td>Scalable Software Systems</td>
<td>3</td>
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<td>Fall only</td>
<td>Graduate Graded</td>
<td>You may take this course for a maximum of 3 units</td>
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<td>CSCI 644</td>
<td>DevOps Engineering</td>
<td>3</td>
<td>CSCI 311, or CSCI 605 and MATH/CSCI 485; and classified graduate standing.</td>
<td>Fall and spring</td>
<td>Graduate Graded</td>
<td>You may take this course for a maximum of 3 units</td>
<td>Graduate Division, Laptop required</td>
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<td>CSCI 650</td>
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<td>3</td>
<td>CSCI 311 and classified graduate standing.</td>
<td>Spring only</td>
<td>Graduate Graded</td>
<td>You may take this course for a maximum of 3 units</td>
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<td>CSCI 651</td>
<td>Applied Graph Theory</td>
<td>3</td>
<td>CSCI 311 and classified graduate standing.</td>
<td>Fall only</td>
<td>Graduate Graded</td>
<td>You may take this course for a maximum of 3 units</td>
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<tr>
<td>CSCI 682</td>
<td>Topics in Artificial Intelligence</td>
<td>3</td>
<td>Classified graduate intelligence.</td>
<td>Inquire at department</td>
<td>Graduate Graded</td>
<td>You may take this course for a maximum of 12 units</td>
<td>Graduate Division</td>
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<tr>
<td>CSCI 693</td>
<td>Research Methods in Computer Science</td>
<td>3</td>
<td>Candidate status.</td>
<td>Inquire at department</td>
<td>Report in Progress: Graded</td>
<td>You may take this course for a maximum of 3 units</td>
<td>Graduate Division</td>
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<td>CSCI 697</td>
<td>Independent Study</td>
<td>1-6</td>
<td>Classified graduate standing, faculty permission.</td>
<td>Fall and spring</td>
<td>Credit/No Credit</td>
<td>You may take this course for a maximum of 6 units</td>
<td>Graduate Division</td>
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<td>CSCI 698</td>
<td>Seminar in Advanced Topics</td>
<td>3</td>
<td>Inquire at department</td>
<td>Inquire at department</td>
<td>Graduate Graded</td>
<td>You may take this course for a maximum of 3 units</td>
<td>Graduate Division</td>
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</table>
CSCI 699P Master's Project 3 Units
Prerequisite: Candidate status.
Typically Offered: Fall and spring
You must register directly with a supervising faculty member. Independent study and investigation of special problems in student’s area of concentration. Both registration and study plan must have approval of the instructor and the student’s graduate advisory committee chair. Master’s Project courses earn a Credit grade upon completion. 9 hours supervision. (002461)
Grade Basis: Report in Progress: CR/NC
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Graduate Division

CSCI 699T Master's Thesis 1-6 Units
Prerequisite: Candidate status.
Typically Offered: Fall and spring
This course is offered for 1.0-6.0 units. You must register directly with a supervising faculty member. Independent study and investigation of special problems in student’s area of concentration. Both registration and study plan must have approval of the instructor and the student’s graduate advisory committee chair. Master’s Thesis courses earn a Credit grade upon completion. 9 hours supervision. (002453)
Grade Basis: Report in Progress: CR/NC
Repeatability: You may take this course for a maximum of 6 units
Course Attributes: Graduate Division

Computer Science Education

CSED 500 Computational Thinking 3 Units
Typically Offered: Summer session only
This course explores broad concepts and applications of Computer Science including Human-Computer Interaction, problem solving, web design, programming, computing and data analysis, and robotics. The course introduces programming in a graphical, block-based development environment. Synchronous online activity; tablet, laptop, or desktop computer is required. 3 hours lecture. (022210)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 6 units
Course Attributes: Upper Division; Laptop required

CSED 501 Computing Practice and Programming 3 Units
Typically Offered: Summer session only
In a broad introduction to Computer Science, this course emphasizes problem solving by collaboratively designing, developing, and evaluating algorithms. The class explores creative development, abstraction, data representation, computer systems and networks, and impacts of computing while learning the fundamentals of high-level programming in Python. Synchronous online discussion and laboratory; laptop or desktop computer is required. 3 hours lecture. (022211)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 6 units
Course Attributes: Upper Division; Laptop required

CSED 510 Technology for Computer Science Education 2 Units
Prerequisite: CSED 500, CSED 501 or CSCI 111.
Typically Offered: Fall only
Hardware and software technologies evolve rapidly. This course provides an overview of components and integrated systems of computers and networking. Students complete a supervised project to plan and integrate educational technologies for Computer Science classrooms. The project explores technology for supporting evidence-based pedagogy to foster interactive, creative, and inclusive Computer Science education. Asynchronous online lecture and supervised project. 6 hours supervision. (022212)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 2 units
Course Attributes: Upper Division; Laptop required

CSED 511 Computing in Society 2 Units
Prerequisite: CSED 500, CSED 501, or CSCI 111.
Typically Offered: Spring only
Computers are ubiquitous and influential in shaping 21st century society. This course discusses the impacts of computers on individuals and on society. It also addresses issues of inclusion and equity in Computer Science pedagogy and relates contemporary social issues to the discipline. Students complete a supervised project to develop educational materials for Computer Science classrooms that contextualize computing in society. 6 hours supervision. (022280)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 2 units
Course Attributes: Upper Division

CSED 590 Software Design, Data Structures, and Algorithms 4 Units
Prerequisite: CSCI 111 or CSED 501.
Typically Offered: Summer session only
This course explores the design and construction of software applications by adopting the Agile software development process. Students practice the fundamentals Object-Oriented Programming with the Java programming language. Concepts include primitive types and operations, objects and classes, boolean expressions, decisions, iteration, single- and multi-dimensional arrays, inheritance, recursion, sorting, and searching. Projects involve software engineering practices and tools, including professional integrated development environments (IDE), to create real software applications. 4 hours lecture. (022284)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 4 units
Course Attributes: Upper Division; Laptop required

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Abbas Attarwala 2022
Associate Professor
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Doctor of Philosophy Virginia Polytechnic Institute

Bryan C Dixon 2013
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Elena Y Harris 2013  
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