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 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 help the occasional student who wanders into our conversation with a question.

"I found a job within a couple months of graduating. The education enables one to speak fluently about many computer science topics, and the clubs enable one to tackle and practice myriad problem-solving skills for the technical aspects of interviews. The education provides 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 FAANG¹ 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

• Computer Information Systems BS (https://catalog.csuchico.edu/colleges-departments/college-engineering-computer-science-construction-management/computer-science/computer-information-systems-bs/)
• Computer Science BS (https://catalog.csuchico.edu/colleges-departments/college-engineering-computer-science-construction-management/computer-science/computer-science-bs/)

Minors

• Computer Science Minor (https://catalog.csuchico.edu/colleges-departments/college-engineering-computer-science-construction-management/computer-science/computer-science-minor/)
• Cybersecurity Minor (https://catalog.csuchico.edu/colleges-departments/college-engineering-computer-science-construction-management/computer-science/cybersecurity-minor/)

Certificates

• Data Science Certificate (https://catalog.csuchico.edu/colleges-departments/college-engineering-computer-science-construction-management/computer-science/data-science-certificate/)

Graduate

Master's

• Computer Science MS (https://catalog.csuchico.edu/colleges-departments/college-engineering-computer-science-construction-management/computer-science/computer-science-ms/)
• Computer Science MS Online (https://catalog.csuchico.edu/colleges-departments/college-engineering-computer-science-construction-management/computer-science/computer-science-online-ms/)

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 numbering system, and course credit units.
Computer Information Systems

CINS 220  PCs and Peripherals
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
Prerequisite: CSCI 111 with a grade of C or higher.
Typically Offered: Fall only
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
tests 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: Lower Division

CINS 370  Introduction to Databases
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
tests 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
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 reads 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
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
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
Prerequisite: CSCI 370 with a grade of C or higher, CINS 465 or CINS 467
with a grade of 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
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
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

Computer Science Seminar 1 Unit
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

Computer's Impact on Society (W) 3 Units W, GW
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

Programming Foundations 6 Units
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 lecture. (022021)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division

Algorithms and Data Structures 4 Units
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

Programming Languages 3 Units
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  3 Units
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)

Course Attributes: Upper Division

CSCI 345  Linux System Administration  3 Units
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

CSCI 385  Introduction to Data Science  3 Units
Prerequisite: CSCI 111, MATH 130, or MATH 230; MATH 109 or MATH 120.
 Typically Offered: Fall only
Data Science is the science of learning from data in order to gain useful predictions and insights. The course provides an overview of the wide area of data science, with a particular focus on the tools required to store, clean, manipulate, visualize, model, and ultimately extract information from various sources of data. Topics include the analytics life cycle, data integration and modeling in R/Python, relational databases and SQL, text processing and sentiment analysis, and data visualization. Emphasis is placed on reproducible research, code sharing, version control, and communicating results to a non-technical audience. 3 hours discussion. (021756)

Cross listing(s): MATH 385
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division

CSCI 389  Industry Internship  1-3 Units
Prerequisite: Department permission.
 Typically Offered: Fall and spring
This internship is offered for 1.0-3.0 units. Students must register directly with a supervising faculty member. 3 hours supervision. (002342)

Grade Basis: Credit/No Credit
Repeatability: You may take this course for a maximum of 15 units
Course Attributes: Upper Division

CSCI 398  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 lecture. (002350)

Grade Basis: Graded
Repeatability: You may take this course more than once
Course Attributes: Upper Division

CSCI 399  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. 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 department chair. 9 hours supervision. (002351)

Grade Basis: Credit/No Credit
Repeatability: You may take this course for a maximum of 6 units
Course Attributes: Upper Division

CSCI 411  Advanced Algorithms  3 Units
Prerequisite: CSCI 311 with a grade of C or higher or Classified Computer Science Graduate Standing.
 Typically Offered: Fall and spring
Students design, implement, and analyze algorithms for solving problems. Topics include greedy algorithms, dynamic programming, graphs (topological sort, strongly connected components), shortest paths (Bellman-Ford, Floyd-Warshall), minimum spanning trees (Kruskal’s), flow network (max flow, min cut, maximum bipartite matching), string search (suffix tree, suffix array, Burrows-Wheeler’s Transform, longest common prefix array), and advanced topics. This course integrates knowledge of data structures, algorithms, and programming. 3 hours lecture. (002371)

Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division; Laptop required

CSCI 415  Theory of Computation  3 Units
Prerequisite: CSCI 311 with a grade of C or higher.
 Typically Offered: Fall and spring
An introduction to formal languages, grammars, and automata theory. Topics include finite automata, regular expressions, context-free grammars, Turing machines, computability, and complexity including P and NP classes, NP complete classes and problems, and undecidable problems. 3 hours lecture. (022576)

Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division; Laptop required
CSCI 417  Applied Linear Algebra for Computer Science    3 Units
Prerequisite: CAGD 280, CSCI 211, or MECH 208 each with a grade of C or higher; or classified graduate standing.
Typically Offered: Spring only
In this course, linear algebra is studied from a computer science (CS) and algorithmic perspective, emphasizing its critical role in various CS domains. The course is centered around real-world CS applications and hands-on programming exercises. Students not only master the core concepts of vectors and matrices but also recognize their practical utility in contemporary computational challenges in CS. Throughout the course, students are exposed to a programming language of the instructor's choosing and use it to delve into an array of CS applications such as combinatorial optimization, image compression via principal component analysis (PCA), computer graphics, page rank algorithm, machine learning, and scientific visualization. 3 hours lecture. (022545)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division; Laptop required

CSCI 430  Software Engineering    3 Units
Prerequisite: CSCI 311 with a grade of C or higher.
Typically Offered: Fall and spring
An overview of software engineering principles, practice, and tools. Topics include: agile software engineering methodologies, requirements engineering, test-driven development, software design patterns, MVC architecture, version control, software metrics, and static analysis. Students work in groups to design and implement a semester-long open source software project. 2 hours activity, 2 hours discussion. (002310)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division

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

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
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<td>CSCI 499H</td>
<td>Honors Research Project/Thesis</td>
<td>3</td>
<td>Acceptance into Honors in the Major program.</td>
<td>Fall and spring</td>
<td>Graded</td>
<td>Upper Division</td>
</tr>
<tr>
<td>CSCI 511H</td>
<td>Object-Oriented Programming - Honors</td>
<td>3</td>
<td>CSCI 311 with a grade of C or higher; acceptance into Honors in the Major program.</td>
<td>Fall only</td>
<td>Graded</td>
<td>Upper Division</td>
</tr>
<tr>
<td>CSCI 540</td>
<td>Systems Programming</td>
<td>3</td>
<td>CSCI 440 with a grade of C or higher.</td>
<td>Fall only</td>
<td>Graded</td>
<td>Upper Division</td>
</tr>
<tr>
<td>CSCI 546</td>
<td>Network Forensics</td>
<td>3</td>
<td>CSCI 446, EECE 446, or MINS 346 with a grade of C or higher.</td>
<td>Spring only</td>
<td>Graded</td>
<td>Upper Division</td>
</tr>
<tr>
<td>CSCI 515</td>
<td>Compiler Design</td>
<td>3</td>
<td>CSCI 311 with a grade of C or higher.</td>
<td>Fall and spring</td>
<td>Graded</td>
<td>Upper Division</td>
</tr>
<tr>
<td>CSCI 546H</td>
<td>Applied Quantum Computing for Computer Scientists</td>
<td>3</td>
<td>CSCI 311 with a grade of C or higher; MATH 109, MATH 120, or MATH 315; or Classified Computer Science Graduate Standing.</td>
<td>Spring only</td>
<td>Graded</td>
<td>Upper Division</td>
</tr>
<tr>
<td>CSCI 511</td>
<td>Advanced Object-Oriented Programming</td>
<td>3</td>
<td>CSCI 311 with a grade of C or higher.</td>
<td>Fall only</td>
<td>Graded</td>
<td>Upper Division</td>
</tr>
<tr>
<td>CSCI 446</td>
<td>Network Forensics</td>
<td>3</td>
<td>CSCI 446, EECE 446, or MINS 346 with a grade of C or higher.</td>
<td>Spring only</td>
<td>Graded</td>
<td>Upper Division</td>
</tr>
</tbody>
</table>

**Course Attributes:**
- **Repeatability:** You may take this course for a maximum of 6 units
- **Grade Basis:** Credit/No Credit
- **Typically Offered:** Fall and spring
- **Grade Basis:** Graded
- **Typically Offered:** Spring only
- **Grade Basis:** Graded
- **Typically Offered:** Fall only
- **Grade Basis:** Graded
- **Typically Offered:** Fall and spring
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- **Typically Offered:** Fall and spring
- **Grade Basis:** Graded
- **Typically Offered:** Fall only
- **Grade Basis:** Graded
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSCI 551</td>
<td>Numerical Methods and Parallel Programming</td>
<td>4</td>
</tr>
<tr>
<td>Prerequisite</td>
<td>CSCI 440 with a grade of C or higher; MATH 109 or MATH 120, or Classified Computer Science Graduate Standing.</td>
<td></td>
</tr>
<tr>
<td>Typically Offered</td>
<td>Fall and spring</td>
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</tr>
<tr>
<td>Course Attributes</td>
<td>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)</td>
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<tr>
<td>Grade Basis</td>
<td>Graded</td>
<td></td>
</tr>
<tr>
<td>Repeatability</td>
<td>You may take this course for a maximum of 4 units</td>
<td></td>
</tr>
<tr>
<td>CSCI 565</td>
<td>Advanced Web and Mobile App Development</td>
<td>3</td>
</tr>
<tr>
<td>Prerequisite</td>
<td>CINS 467 with a grade C or higher.</td>
<td></td>
</tr>
<tr>
<td>Typically Offered</td>
<td>Spring only</td>
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</tr>
<tr>
<td>Course Attributes</td>
<td>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)</td>
<td></td>
</tr>
<tr>
<td>Grade Basis</td>
<td>Graded</td>
<td></td>
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<tr>
<td>Repeatability</td>
<td>You may take this course for a maximum of 3 units</td>
<td></td>
</tr>
<tr>
<td>CSCI 566</td>
<td>Computer Graphics Programming</td>
<td>3</td>
</tr>
<tr>
<td>Prerequisite</td>
<td>CSCI 311 with a grade of C or higher.</td>
<td></td>
</tr>
<tr>
<td>Typically Offered</td>
<td>Fall only</td>
<td></td>
</tr>
<tr>
<td>Course Attributes</td>
<td>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)</td>
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<tr>
<td>Grade Basis</td>
<td>Graded</td>
<td></td>
</tr>
<tr>
<td>Repeatability</td>
<td>You may take this course for a maximum of 3 units</td>
<td></td>
</tr>
<tr>
<td>CSCI 580</td>
<td>Artificial Intelligence</td>
<td>3</td>
</tr>
<tr>
<td>Prerequisite</td>
<td>CSCI 311 with a grade of C or higher.</td>
<td></td>
</tr>
<tr>
<td>Typically Offered</td>
<td>Fall and spring</td>
<td></td>
</tr>
<tr>
<td>Course Attributes</td>
<td>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)</td>
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<tr>
<td>Grade Basis</td>
<td>Graded</td>
<td></td>
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<tr>
<td>Repeatability</td>
<td>You may take this course for a maximum of 3 units</td>
<td></td>
</tr>
<tr>
<td>CSCI 580H</td>
<td>Artificial Intelligence - Honors</td>
<td>3</td>
</tr>
<tr>
<td>Prerequisite</td>
<td>CSCI 311 with a grade of C or higher, acceptance into Honors in the Major program.</td>
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<tr>
<td>Typically Offered</td>
<td>Fall and spring</td>
<td></td>
</tr>
<tr>
<td>Course Attributes</td>
<td>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)</td>
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<tr>
<td>Grade Basis</td>
<td>Graded</td>
<td></td>
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<tr>
<td>Repeatability</td>
<td>You may take this course for a maximum of 3 units</td>
<td></td>
</tr>
<tr>
<td>CSCI 581</td>
<td>Machine Learning</td>
<td>3</td>
</tr>
<tr>
<td>Prerequisite</td>
<td>CSCI 311 with a grade of C or higher; MATH 109 or MATH 120, or Classified Computer Science Graduate Standing.</td>
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<tr>
<td>Typically Offered</td>
<td>Fall and spring</td>
<td></td>
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<tr>
<td>Course Attributes</td>
<td>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)</td>
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<tr>
<td>Grade Basis</td>
<td>Graded</td>
<td></td>
</tr>
<tr>
<td>Repeatability</td>
<td>You may take this course for a maximum of 3 units</td>
<td></td>
</tr>
<tr>
<td>CSCI 581H</td>
<td>Machine Learning- Honors</td>
<td>3</td>
</tr>
<tr>
<td>Prerequisite</td>
<td>CSCI 311 with a grade of C or higher.</td>
<td></td>
</tr>
<tr>
<td>Typically Offered</td>
<td>Fall and spring</td>
<td></td>
</tr>
<tr>
<td>Course Attributes</td>
<td>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)</td>
<td></td>
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<tr>
<td>Grade Basis</td>
<td>Graded</td>
<td></td>
</tr>
<tr>
<td>Repeatability</td>
<td>You may take this course for a maximum of 3 units</td>
<td></td>
</tr>
</tbody>
</table>
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 biodiagnostics; 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 associative 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

CSCI 640  Scalable Software Systems  3 Units
Prerequisite: CSCI 311 or CSCI 211 and CSCI 605; classified graduate standing.
Typically Offered: Fall only
This course offers a practical exploration of topics in scalable computing. Students gain hand-on experience building things to solve a multitude of topics in scalable computing. Students learn how to solve computationally complex problems involving big data. Topics include but are not limited to single-node and multi-node parallelism, threading, and coprocessor programming. 3 hours seminar.  (002430)
Grade Basis: Graduate Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Graduate Division; Laptop required

CSCI 644  DevOps Engineering  3 Units
Prerequisite: CSCI 311, or CSCI 605 and MATH/CSCI 485; and classified graduate standing.
Typically Offered: Fall and spring
This course introduces students to distributed system administration skills, setting up distributed computation environments, version control, build systems, dependency management, continuous integration, testing, cloud virtualization technologies, and setting up mobile, web, machine learning, artificial intelligence, and data science pipelines. 3 hours discussion.  (022536)
Grade Basis: Graduate Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Graduate Division; Laptop required

CSCI 650  Algorithms and Computability  3 Units
Prerequisite: CSCI 311 and classified graduate standing.
Typically Offered: Spring only
This course presents algorithm design techniques (such as divide-and-conquer, greedy algorithms, dynamic programming, and others), mathematical and empirical analysis of algorithms, computability, Rice's theorem, P and NP classes, NP-completeness, and recent advances in algorithms. 3 hours seminar.  (002417)
Grade Basis: Graduate Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Graduate Division

CSCI 651  Applied Graph Theory  3 Units
Prerequisite: CSCI 311 and classified graduate standing.
Typically Offered: Fall only
This course covers foundational aspects of network science, the study of graph representations and the patterns they contain, along with tools and techniques for analyzing network data. Topics include random graph models, measures of structural importance, information spread in data networks, and methods for embedding graphs in real space. This is a project-based course. Students implement and apply graph algorithms on real-world network data. 3 hours lecture.  (022206)
Grade Basis: Graduate Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Graduate Division

CSCI 682  Topics in Artificial Intelligence  3 Units
Prerequisite: Classified graduate standing.
Typically Offered: Inquire at department
Further study of selected advanced topics in artificial intelligence as presented in recently published journals; possible emphasis on research interests and/or projects of faculty in the department. Consult the Graduate Coordinator to determine how many units may be counted toward your major. 3 hours lecture.  (002402)
Grade Basis: Graduate Graded
Repeatability: You may take this course for a maximum of 12 units
Course Attributes: Graduate Division

CSCI 689  Internship  1-3 Units
Typically Offered: Fall and spring
0 hours supervision.  (020142)
Grade Basis: Report in Progress: CR/NC
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Graduate Division

CSCI 693  Research Methods in Computer Science  3 Units
Prerequisite: Candidate status.
Typically Offered: Fall and spring
This course interweaves three distinct themes (investigation, experimentation, and technical writing), that culminate in a comprehensive research project, written report, presentation, and oral defense. First, the students are immersed into the research process within Computer Science. This includes an understanding of the role, ethics, and responsibility of researchers in Computer Science. The second focus is on rigorous design of experiments for the purpose of testing research hypotheses, simulations, and models, and interpreting the results of those experiments. Finally, proficiency in communication of scientific ideas and findings will be addressed, from intensive reading, critiques, technical writing and oral presentations. 9 hours supervision.  (020616)
Grade Basis: Report in Progress: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Graduate Division; Laptop required

CSCI 697  Independent Study  1-6 Units
Prerequisite: Classified graduate standing, faculty permission.
Typically Offered: Fall and spring
This course is an independent study 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. 9 hours supervision.  (002451)
Grade Basis: Credit/No Credit
Repeatability: You may take this course for a maximum of 6 units
Course Attributes: Graduate Division
CSCI 698  Seminar in Advanced Topics  3 Units
Typically Offered: Inquire at department
This course is a seminar offered for 1.0-3.0 units. Typical subjects in past semesters have included microprogramming theory, operating system development, software engineering principles, data communications, analysis of algorithms, and program optimization. Consult the Class Schedule for listing and prerequisites. 2 hours activity, 2 hours discussion.  (002446)
Grade Basis: Graduate Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Graduate Division

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

Computer Science Department

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Doctor of Philosophy University of Waterloo

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Doctor of Philosophy Virginia Polytechnic Institute

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Shahid Iqbal  2010
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Shelley M Wong  2019
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