Computer Science (COMPSCI)

Courses

COMPSCI 3L Introduction to Symbolic Programming 4 Units
Introduction to computer programming, emphasizing symbolic computation and functional programming style. Students will write a project of at least 200 lines of code in Scheme (a dialect of the LISP programming language).
Rules & Requirements

Prerequisites: High school algebra

Credit Restrictions: Students may remove a deficiency in 3 by taking 3L.

Hours & Format

Fall and/or spring: 15 weeks - 1 hour of lecture and 6 hours of laboratory per week

Summer: 8 weeks - 2 hours of lecture and 12 hours of laboratory per week

Additional Details

Subject/Course Level: Computer Science/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Clancy

COMPSCI 3S Introduction to Symbolic Programming (Self-Paced) 1 - 4 Units
The same material as 3 but in a self-paced format; introduction to computer programming, emphasizing symbolic computation and functional programming style, using the Scheme programming language. Units assigned depend on amount of work completed. The first two units must be taken together.
Rules & Requirements

Prerequisites: High school algebra

Credit Restrictions: Refer to computer science service course restrictions. Course may be repeated up to 4 units.

Repeat rules: Course may be repeated for a maximum of 4 units.

Hours & Format

Fall and/or spring: 15 weeks - 1-4 hours of self-paced and 3-9 hours of laboratory per week

Additional Details

Subject/Course Level: Computer Science/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Garcia

COMPSCI 9A Matlab for Programmers 2 Units
Introduction to the constructs in the Matlab programming language, aimed at students who already know how to program. Array and matrix operations, functions and function handles, control flow, plotting and image manipulation, cell arrays and structures, and the Symbolic Mathematics toolbox.
Rules & Requirements

Prerequisites: Programming experience equivalent to that gained in Computer Science 10; familiarity with applications of matrix processing

Credit Restrictions: Refer to computer science service course restrictions.

Repeat rules: Course may be repeated for a maximum of 4 units.

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of self-paced per week

Additional Details

Subject/Course Level: Computer Science/Undergraduate

Grading/Final exam status: Offered for pass/not pass grade only. Final exam required.

Instructor: Garcia

COMPSCI 9C C for Programmers 2 Units
Self-paced course in the C programming language for students who already know how to program. Computation, input and output, flow of control, functions, arrays, and pointers, linked structures, use of dynamic storage, and implementation of abstract data types.
Rules & Requirements

Prerequisites: Programming experience with pointers (or addresses in assembly language) and linked data structures equivalent to that gained in Computer Science 9B or 61A, or Engineering 7

Credit Restrictions: Refer to computer science service course restrictions.

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of self-paced per week

Additional Details

Subject/Course Level: Computer Science/Undergraduate

Grading/Final exam status: Offered for pass/not pass grade only. Final exam required.

Instructor: Garcia

COMPSCI 9D Scheme and Functional Programming for Programmers 2 Units
Self-paced course in functional programming, using the Scheme programming language, for students who already know how to program. Recursion; higher-order functions; list processing; implementation of rule-based querying.
Rules & Requirements

Prerequisites: Programming experience similar to that gained in Computer Science 10 or Engineering 7

Credit Restrictions: Refer to computer science service course restrictions.

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of self-paced per week

Additional Details

Subject/Course Level: Computer Science/Undergraduate

Grading/Final exam status: Offered for pass/not pass grade only. Final exam required.

Instructor: Garcia

COMPSCI 9E Productive Use of the UNIX Environment 2 Units
Use of UNIX utilities and scripting facilities for customizing the programming environment, organizing files (possibly in more than one computer account), implementing a personal database, reformatting text, and searching for online resources.
Rules & Requirements

Prerequisites: Programming experience similar to that gained in Computer Science 61A or Engineering 7; DOS or UNIX experience

Credit Restrictions: Refer to computer science service course restrictions.

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of self-paced per week

Additional Details

Subject/Course Level: Computer Science/Undergraduate

Grading/Final exam status: Offered for pass/not pass grade only. Final exam required.

Instructor: Garcia

COMPSCI 9F C++ for Programmers 2 Units
Self-paced introduction to the constructs provided in the C++ programming language for procedural and object-oriented programming, aimed at students who already know how to program.
Rules & Requirements

Prerequisites: Programming experience equivalent to that gained in Computer Science 9B or 61A, or Engineering 7

Credit Restrictions: Refer to computer science service course restrictions in the <General Catalog>.

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of self-paced per week

Additional Details

Subject/Course Level: Computer Science/Undergraduate

Grading/Final exam status: Offered for pass/not pass grade only. Final exam required.

Instructor: Garcia

COMPSCI 9G JAVA for Programmers 2 Units
Self-paced course in Java for students who already know how to program. Applets; variables and computation; events and flow of control; classes and objects; inheritance; GUI elements; applications; arrays, strings, files, and linked structures; exceptions; threads.
Rules & Requirements

Prerequisites: 9C or 9F or 61A plus experience with object-oriented programming or C-based language

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of self-paced per week

Additional Details

Subject/Course Level: Computer Science/Undergraduate

Grading/Final exam status: Offered for pass/not pass grade only. Final exam required.

Instructor: Garcia

COMPSCI 9H Python for Programmers 2 Units
Introduction to the constructs provided in the Python programming language, aimed at students who already know how to program. Flow of control; strings, tuples, lists, and dictionaries; CGI programming; file input and output; object-oriented programming; GUI elements.
Rules & Requirements

Prerequisites: Programming experience equivalent to that gained in Computer Science 10

Credit Restrictions: Refer to computer science service course restrictions.

Hours & Format

Fall and/or spring: 15 weeks - 1 hour of self-paced per week

Additional Details

Subject/Course Level: Computer Science/Undergraduate

Grading/Final exam status: Offered for pass/not pass grade only. Final exam required.

Instructor: Garcia

COMPSCI 10 The Beauty and Joy of Computing 4 Units
An introduction to the beauty and joy of computing. The history, social implications, great principles, and future of computing. Beautiful applications that have changed the world. How computing empowers discovery and progress in other fields. Relevance of computing to the student and society will be emphasized. Students will learn the joy of programming a computer using a friendly, graphical language, and will complete a substantial team programming project related to their interests.
Hours & Format

Fall and/or spring: 15 weeks - 2 hours of lecture, 1 hour of discussion, and 4 hours of laboratory per week

Summer: 8 weeks - 4 hours of lecture, 2 hours of discussion, and 8 hours of laboratory per week

Additional Details

Subject/Course Level: Computer Science/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructors: Garcia, Harvey

COMPSCI W10 The Beauty and Joy of Computing 4 Units
This course meets the programming prerequisite for 61A. An introduction to the beauty and joy of computing. The history, social implications, great principles, and future of computing. Beautiful applications that have changed the world. How computing empowers discovery and progress in other fields. Relevance of computing to the student and society will be emphasized. Students will learn the joy of programming a computer using a friendly, graphical language, and will complete a substantial team programming project related to their interests.
Rules & Requirements

Credit Restrictions: Students will receive no credit for W10 after taking 10. A deficient grade in 10 may be removed by taking W10.

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of web-based lecture and 5 hours of web-based discussion per week

Summer: 8 weeks - 4 hours of web-based lecture and 10 hours of web-based discussion per week

Online: This is an online course.

Additional Details

Subject/Course Level: Computer Science/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructors: Garcia, Harvey

COMPSCI 39J Freshman/Sophomore Seminar 1.5 - 4 Units
Freshman and sophomore seminars offer lower division students the opportunity to explore an intellectual topic with a faculty member and a group of peers in a small-seminar setting. These seminars are offered in all campus departments; topics vary from department to department and from semester to semester. Enrollment limits are set by the faculty, but the suggested limit is 25.
Rules & Requirements

Prerequisites: Priority given to freshmen and sophomores

Repeat rules: Course may be repeated for credit when topic changes.

Hours & Format

Fall and/or spring: 15 weeks - 2-4 hours of seminar per week

Additional Details

Subject/Course Level: Computer Science/Undergraduate

Grading/Final exam status: The grading option will be decided by the instructor when the class is offered. Final exam required.

COMPSCI 39K Freshman/Sophomore Seminar 1.5 - 4 Units
Freshman and sophomore seminars offer lower division students the opportunity to explore an intellectual topic with a faculty member and a group of peers in a small-seminar setting. These seminars are offered in all campus departments; topics vary from department to department and from semester to semester. Enrollment limits are set by the faculty, but the suggested limit is 25.

Rules & Requirements

Prerequisites: Priority given to freshmen and sophomores

Repeat rules: Course may be repeated for credit when topic changes.

Hours & Format

Fall and/or spring: 15 weeks - 2-4 hours of seminar per week

Additional Details

Subject/Course Level: Computer Science/Undergraduate

Grading/Final exam status: The grading option will be decided by the instructor when the class is offered. Final exam required.

COMPSCI 39M Freshman/Sophomore Seminar 1.5 - 4 Units
Freshman and sophomore seminars offer lower division students the opportunity to explore an intellectual topic with a faculty member and a group of peers in a small-seminar setting. These seminars are offered in all campus departments; topics vary from department to department and from semester to semester. Enrollment limits are set by the faculty, but the suggested limit is 25.

Rules & Requirements

Prerequisites: Priority given to freshmen and sophomores

Repeat rules: Course may be repeated for credit when topic changes.

Hours & Format

Fall and/or spring: 15 weeks - 2-4 hours of seminar per week

Additional Details

Subject/Course Level: Computer Science/Undergraduate

Grading/Final exam status: The grading option will be decided by the instructor when the class is offered. Final exam required.

COMPSCI 39N Freshman/Sophomore Seminar 1.5 - 4 Units
Freshman and sophomore seminars offer lower division students the opportunity to explore an intellectual topic with a faculty member and a group of peers in a small-seminar setting. These seminars are offered in all campus departments; topics vary from department to department and from semester to semester. Enrollment limits are set by the faculty, but the suggested limit is 25.

Rules & Requirements

Prerequisites: Priority given to freshmen and sophomores

Repeat rules: Course may be repeated for credit when topic changes.

Hours & Format

Fall and/or spring: 15 weeks - 2-4 hours of seminar per week

Additional Details

Subject/Course Level: Computer Science/Undergraduate

Grading/Final exam status: The grading option will be decided by the instructor when the class is offered. Final exam required.

COMPSCI 39P Freshman/Sophomore Seminar 1.5 - 4 Units
Freshman and sophomore seminars offer lower division students the opportunity to explore an intellectual topic with a faculty member and a group of peers in a small-seminar setting. These seminars are offered in all campus departments; topics vary from department to department and from semester to semester. Enrollment limits are set by the faculty, but the suggested limit is 25.

Rules & Requirements

Prerequisites: Priority given to freshmen and sophomores

Repeat rules: Course may be repeated for credit when topic changes.

Hours & Format

Fall and/or spring: 15 weeks - 2-4 hours of seminar per week

Additional Details

Subject/Course Level: Computer Science/Undergraduate

Grading/Final exam status: The grading option will be decided by the instructor when the class is offered. Final exam required.

COMPSCI 39Q Freshman/Sophomore Seminar 1.5 - 4 Units
Freshman and sophomore seminars offer lower division students the opportunity to explore an intellectual topic with a faculty member and a group of peers in a small-seminar setting. These seminars are offered in all campus departments; topics vary from department to department and from semester to semester. Enrollment limits are set by the faculty, but the suggested limit is 25.
Rules & Requirements

Prerequisites: Priority given to freshmen and sophomores

Repeat rules: Course may be repeated for credit when topic changes.

Hours & Format

Fall and/or spring: 15 weeks - 2-4 hours of seminar per week

Additional Details

Subject/Course Level: Computer Science/Undergraduate

Grading/Final exam status: The grading option will be decided by the instructor when the class is offered. Final exam required.

COMPSCI 39R Freshman/Sophomore Seminar 1.5 - 4 Units
Freshman and sophomore seminars offer lower division students the opportunity to explore an intellectual topic with a faculty member and a group of peers in a small-seminar setting. These seminars are offered in all campus departments; topics vary from department to department and from semester to semester. Enrollment limits are set by the faculty, but the suggested limit is 25.
Rules & Requirements

Prerequisites: Priority given to freshmen and sophomores

Repeat rules: Course may be repeated for credit when topic changes.

Hours & Format

Fall and/or spring: 15 weeks - 2-4 hours of seminar per week

Additional Details

Subject/Course Level: Computer Science/Undergraduate

Grading/Final exam status: The grading option will be decided by the instructor when the class is offered. Final exam required.

COMPSCI 47A Completion of Work in Computer Science 61A 1 Unit
Implementation of generic operations. Streams and iterators. Implementation techniques for supporting functional, object-oriented, and constraint-based programming in the Scheme programming language. Together with 9D, 47A constitutes an abbreviated, self-paced version of 61A for students who have already taken a course equivalent to 61B.
Rules & Requirements

Prerequisites: 61B or equivalent, 9D, and consent of instructor

Credit Restrictions: Students will receive no credit for 47A after taking 61A.

Hours & Format

Fall and/or spring: 15 weeks - 0 hours of self-paced per week

Additional Details

Subject/Course Level: Computer Science/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Garcia

COMPSCI 47B Completion of Work in Computer Science 61B 1 Unit
Iterators. Hashing, applied to strings and multi-dimensional structures. Heaps. Storage management. Design and implementation of a program containing hundreds of lines of code. Students with sufficient partial credit in 61B may, with consent of instructor, complete the credit in this self-paced course.
Rules & Requirements

Prerequisites: A course in data structures, 9G or equivalent, and consent of instructor

Credit Restrictions: Students will receive no credit for 47B after taking 61B.

Hours & Format

Fall and/or spring: 15 weeks - 0 hours of self-paced per week

Additional Details

Subject/Course Level: Computer Science/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Garcia

COMPSCI 47C Completion of Work in Computer Science 61C 1 Unit
MIPS instruction set simulation. The assembly and linking process. Caches and virtual memory. Pipelined computer organization. Students with sufficient partial credit in 61C may, with consent of instructor, complete the credit in this self-paced course.
Rules & Requirements

Prerequisites: Experience with assembly language including writing an interrupt handler, 9C or equivalent, and consent of instructor

Credit Restrictions: Students will receive no credit for 47C after taking 61C.

Hours & Format

Fall and/or spring: 15 weeks - 0 hours of self-paced per week

Additional Details

Subject/Course Level: Computer Science/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Garcia

COMPSCI 61A The Structure and Interpretation of Computer Programs 4 Units
Introduction to programming and computer science. This course exposes students to techniques of abstraction at several levels: (a) within a programming language, using higher-order functions, manifest types, data-directed programming, and message-passing; (b) between programming languages, using functional and rule-based languages as examples. It also relates these techniques to the practical problems of implementation of languages and algorithms on a von Neumann machine. There are several significant programming projects.
Rules & Requirements

Prerequisites: Mathematics 1A (may be taken concurrently); programming experience equivalent to that gained in 3 or the Advanced Placement Computer Science A course

Credit Restrictions: Students will receive no credit for Computer Science 61A after completing Computer Science 47A or Computer Science 61AS. A deficient grade in Computer Science 61AS may be removed by taking Computer Science 61A.

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture, 1.5 hours of discussion, and 1.5 hours of laboratory per week

Summer: 8 weeks - 6 hours of lecture, 3 hours of discussion, and 3 hours of laboratory per week

Additional Details

Subject/Course Level: Computer Science/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructors: Garcia, Hilfinger

COMPSCI 61AS The Structure and Interpretation of Computer Programs (Self-Paced) 1 - 4 Units
Introductory programming and computer science. Abstraction as means to control program complexity. Programming paradigms: functional, object-oriented, client/server, and declarative (logic). Control abstraction: recursion and higher order functions. Introduction to asymptotic analysis of algorithms. Data abstraction: abstract data types, type-tagged data, first class data types, sequences implemented as lists and as arrays, generic operators implemented with data-directed programming and with message passing. Implementation of object-oriented programming with closures over dispatch procedures. Introduction to interpreters and compilers. There are several significant programming projects. Course may be completed in one or two semesters. Students must complete a mimimum of two units during their first semester of 61AS.
Rules & Requirements

Prerequisites: Mathematics 1A (may be taken concurrently). Programming experience equivalent to that gained in 10 or the Advanced Placement Computer Science A course is recommended, but is not essential; students without this experience will begin at an earlier point in the online course

Credit Restrictions: Students will receive no credit for Computer Science 61AS after completing Computer Science 47A or Computer Science 61A. A deficient grade in Computer Science 61A may be removed by taking Computer Science 61AS.

Repeat rules: Course may be repeated for a maximum of 4 units.Course may be repeated for a maximum of 4 units.

Hours & Format

Fall and/or spring: 15 weeks - 6 hours of laboratory per week

Summer:
6 weeks - 15 hours of laboratory per week
8 weeks - 11 hours of laboratory per week

Additional Details

Subject/Course Level: Computer Science/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructors: Garcia, Harvey, Hilfinger

COMPSCI 61B Data Structures 4 Units
Fundamental dynamic data structures, including linear lists, queues, trees, and other linked structures; arrays strings, and hash tables. Storage management. Elementary principles of software engineering. Abstract data types. Algorithms for sorting and searching. Introduction to the Java programming language.
Rules & Requirements

Prerequisites: 61A or Engineering 7

Credit Restrictions: Students will receive no credit for 61B after taking 47B or 61BL. Deficiency in 61BL may be removed by taking 61B.

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture, 1 hour of discussion, and 2 hours of laboratory per week

Summer: 8 weeks - 6 hours of lecture, 2 hours of discussion, and 4 hours of laboratory per week

Additional Details

Subject/Course Level: Computer Science/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructors: Hilfinger, Shewchuk

COMPSCI 61BL Data Structures and Programming Methodology 4 Units
The same material as in 61B, but in a laboratory-based format.
Rules & Requirements

Prerequisites: 61A or Engineering 7

Credit Restrictions: Students will receive no credit for 61BL after taking 47B or 61B. Deficiency in 61B may be removed by taking 61BL.

Hours & Format

Fall and/or spring: 15 weeks - 1 hour of lecture and 6 hours of laboratory per week

Summer: 8 weeks - 2 hours of lecture and 12 hours of laboratory per week

Additional Details

Subject/Course Level: Computer Science/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Hilfinger

COMPSCI 61C Machine Structures 4 Units
The internal organization and operation of digital computers. Machine architecture, support for high-level languages (logic, arithmetic, instruction sequencing) and operating systems (I/O, interrupts, memory management, process switching). Elements of computer logic design. Tradeoffs involved in fundamental architectural design decisions.
Rules & Requirements

Prerequisites: 61A, along with either 61B or 61BL, or programming experience equivalent to that gained in 9C, 9F, or 9G

Credit Restrictions: Students will receive no credit for 61C after taking 47C or 61CL. Deficiency in 61C may be removed by taking 61CL.

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture, 1 hour of discussion, and 2 hours of laboratory per week

Summer: 8 weeks - 6 hours of lecture, 2 hours of discussion, and 4 hours of laboratory per week

Additional Details

Subject/Course Level: Computer Science/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructors: Garcia, Franklin, Katz, Patterson

COMPSCI 61CL Machine Structures (Lab-Centric) 4 Units
The same material as in 61C but in a lab-centric format.
Rules & Requirements

Prerequisites: 61A, along with 61B or 61BL, or programming experience equivalent to that gained in 9C, 9F, or 9G

Credit Restrictions: Students will receive no credit for 61CL after taking 47C or 61C. Deficiency in 61C may be removed by taking 61CL.

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of lecture, 1 hour of discussion, and 4 hours of laboratory per week

Summer: 8 weeks - 4 hours of lecture, 2 hours of discussion, and 8 hours of laboratory per week

Additional Details

Subject/Course Level: Computer Science/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructors: Garcia, Patterson

COMPSCI 70 Discrete Mathematics and Probability Theory 4 Units
Logic, infinity, and induction; applications include undecidability and stable marriage problem. Modular arithmetic and GCDs; applications include primality testing and cryptography. Polynomials; examples include error correcting codes and interpolation. Probability including sample spaces, independence, random variables, law of large numbers; examples include load balancing, existence arguments, Bayesian inference.
Rules & Requirements

Prerequisites: Sophomore mathematical maturity, and programming experience equivalent to that gained in 3 or the Advanced Placement Computer Science A course

Credit Restrictions: Students will receive no credit for 70 after taking Mathematics 55.

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Summer: 8 weeks - 6 hours of lecture and 2 hours of discussion per week

Additional Details

Subject/Course Level: Computer Science/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructors: Papadimitriou, Rao, Sinclair, Trevisan, Vazirani, Wagner

COMPSCI C79 Societal Risks and the Law 3 Units
Defining, perceiving, quantifying and measuring risk; identifying risks and estimating their importance; determining whether laws and regulations can protect us from these risks; examining how well existing laws work and how they could be improved; evaluting costs and benefits. Applications may vary by term. This course cannot be used to complete engineering unit or technical elective requirements for students in the College of Engineering.
Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Computer Science/Undergraduate

Grading/Final exam status: Letter grade. Final exam not required.

Also listed as: POL SCI C79/STAT C79

COMPSCI 97 Field Study 1 - 4 Units
Students take part in organized individual field sponsored programs with off-campus companies or tutoring/mentoring relevant to specific aspects and applications of computer science on or off campus. Note Summer CPT or OPT students: written report required. Course does not count toward major requirements, but will be counted in the cumulative units toward graduation.
Rules & Requirements

Prerequisites: Consent of instructor (see department adviser)

Repeat rules: Course may be repeated for credit. Course may be repeated for credit when topic changes.

Hours & Format

Fall and/or spring: 15 weeks - 1-4 hours of fieldwork per week

Summer:
6 weeks - 2.5-10 hours of fieldwork per week
8 weeks - 2-7.5 hours of fieldwork per week

Additional Details

Subject/Course Level: Computer Science/Undergraduate

Grading/Final exam status: Offered for pass/not pass grade only. Final exam not required.

COMPSCI 98 Directed Group Study 1 - 4 Units
Seminars for group study of selected topics, which will vary from year to year. Intended for students in the lower division.
Rules & Requirements

Prerequisites: Consent of instructor

Repeat rules: Course may be repeated for credit. Course may be repeated for credit when topic changes.

Hours & Format

Fall and/or spring: 15 weeks - 1-4 hours of directed group study per week

Additional Details

Subject/Course Level: Computer Science/Undergraduate

Grading/Final exam status: Offered for pass/not pass grade only. Final exam not required.

COMPSCI 99 Individual Study and Research for Undergraduates 1 - 2 Units
A course for lower division students in good standing who wish to undertake a program of individual inquiry initiated jointly by the student and a professor. There are no other formal prerequisites, but the supervising professor must be convinced that the student is able to profit by the program.
Rules & Requirements

Prerequisites: GPA of 3.4 or better

Repeat rules: Course may be repeated for credit. Course may be repeated for credit when topic changes.

Hours & Format

Fall and/or spring: 15 weeks - 0 hours of independent study per week

Summer:
6 weeks - 1-5 hours of independent study per week
8 weeks - 1-4 hours of independent study per week

Additional Details

Subject/Course Level: Computer Science/Undergraduate

Grading/Final exam status: Offered for pass/not pass grade only. Final exam not required.

COMPSCI 146L Programmable Digital Systems Laboratory 2 Units
Hardware description languages for digital system design and interactions with tool flows. Design, implementation, and verification of digital designs. Digital synthesis, partitioning, placement, routing, and simulation for Field-Programmable Gate Arrays. Large digital-system design concepts. Project design component – example, a full processor implementation with peripherals.
Objectives Outcomes

Student Learning Outcomes: This course is a one-time offering to supplement the EE141 course offered in the Fall 2014, with a lab and project section that cover the design of larger digital systems on a programmable chip platform (FPGA). The EE141 lectures in the Fall 2014 already covered the necessary lecture material, so students who took the EE141 lab in the Fall of 2014 will have a chance to expand their skills into the area of FPGA Digital System Design. Hence the pre-requisite for this course is that a student has taken the EE141 course in the Fall 2014.

Rules & Requirements

Prerequisites: Computer Science 61C, Electrical Engineering 105 recommended and Electrical Engineering 141 (taken Fall 2014) - mandatory

Credit Restrictions: Students will receive no credit for Computer Science 146L after taking Fall 2014 version of Computer Science 150.

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of laboratory and 1 hour of discussion per week

Additional Details

Subject/Course Level: Computer Science/Undergraduate

Grading/Final exam status: Offered for pass/not pass grade only. Final exam not required.

Instructor: Stojanovic

COMPSCI C149 Introduction to Embedded Systems 4 Units
This course introduces students to the basics of models, analysis tools, and control for embedded systems operating in real time. Students learn how to combine physical processes with computation. Topics include models of computation, control, analysis and verification, interfacing with the physical world, mapping to platforms, and distributed embedded systems. The course has a strong laboratory component, with emphasis on a semester-long sequence of projects.
Rules & Requirements

Prerequisites: 20N; Computer Science 61C; Computer Science 70 or Math 55

Credit Restrictions: Students will receive no credit for Electrical Engineering C149/Computer Science C149 after
taking Electrical Engineering C249M/Computer Science C249M. Students may remove a deficient grade in Electrical Engineering C149/Computer Science C149 after taking Electrical Engineering 124.

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 3 hours of laboratory per week

Additional Details

Subject/Course Level: Computer Science/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructors: Lee, Seshia

Also listed as: EL ENG C149

COMPSCI 150 Components and Design Techniques for Digital Systems 5 Units
Basic building blocks and design methods to contruct synchronous digital systems, such as general purpose processors, hardware accelerators, and application specific processors. Representations and design methodologies for digital systems. Logic design using combinatorial and sequential circuits. Digital system implementation considering hardware descriptions languages, computer-aided design tools, field-programmable gate array architectures, and CMOS logic gates and state elements. Interfaces between peripherals, processor hardware, and software. Formal hardware laboratories and substantial design project.
Rules & Requirements

Prerequisites: Computer Science 61C, Electrical Engineering 40

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture, 1 hour of discussion, and 3 hours of laboratory per week

Additional Details

Subject/Course Level: Computer Science/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructors: Katz, Pister, Wawrzynek

COMPSCI 152 Computer Architecture and Engineering 4 Units
Instruction set architecture, microcoding, pipelining (simple and complex). Memory hierarchies and virtual memory. Processor parallelism: VLIW, vectors, multithreading. Multiprocessors.
Rules & Requirements

Prerequisites: 61C

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 2 hours of discussion per week

Additional Details

Subject/Course Level: Computer Science/Undergraduate

Grading/Final exam status: Letter grade. Alternative to final exam.

Instructors: Asanovic, Culler, Kubiatowicz, Wawrzynek

COMPSCI 160 User Interface Design and Development 4 Units
The design, implementation, and evaluation of user interfaces. User-centered design and task analysis. Conceptual models and interface metaphors. Usability inspection and evaluation methods. Analysis of user study data. Input methods (keyboard, pointing, touch, tangible) and input models. Visual design principles. Interface prototyping and implementation methodologies and tools. Students will develop a user interface for a specific task and target user group in teams.
Rules & Requirements

Prerequisites: Computer Science 61B or 61BL

Credit Restrictions: Students will receive no credit for Computer Science 160 after taking Computer Science 260A.

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Summer: 8 weeks - 6 hours of lecture and 2 hours of discussion per week

Additional Details

Subject/Course Level: Computer Science/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructors: Agrawala, Canny, Hartmann, Paulos

COMPSCI 161 Computer Security 4 Units
Introduction to computer security. Cryptography, including encryption, authentication, hash functions, cryptographic protocols, and applications. Operating system security, access control. Network security, firewalls, viruses, and worms. Software security, defensive programming, and language-based security. Case studies from real-world systems.
Rules & Requirements

Prerequisites: 61C (Machine Structures), plus either 70 (Discrete Mathematics) or Mathematics 55

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Summer: 8 weeks - 6 hours of lecture and 2 hours of discussion per week

Additional Details

Subject/Course Level: Computer Science/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructors: Paxson, Song, Tygar, Wagner

COMPSCI 162 Operating Systems and System Programming 4 Units
Basic concepts of operating systems and system programming. Utility programs, subsystems, multiple-program systems. Processes, interprocess communication, and synchronization. Memory allocation, segmentation, paging. Loading and linking, libraries. Resource allocation, scheduling, performance evaluation. File systems, storage devices, I/O systems. Protection, security, and privacy.
Rules & Requirements

Prerequisites: Computer Science 61B, 61C, and 70

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture, 1 hour of discussion, and 0 hours of laboratory per week

Summer: 8 weeks - 6 hours of lecture, 2 hours of discussion, and 0 hours of laboratory per week

Additional Details

Subject/Course Level: Computer Science/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructors: Joseph, Kubiatowicz, Stoica

COMPSCI 164 Programming Languages and Compilers 4 Units
Survey of programming languages. The design of modern programming languages. Principles and techniques of scanning, parsing, semantic analysis, and code generation. Implementation of compilers, interpreters, and assemblers. Overview of run-time organization and error handling.
Rules & Requirements

Prerequisites: 61B and 61C

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Computer Science/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructors: Bodik, Hilfinger, Necula

COMPSCI 168 Introduction to the Internet: Architecture and Protocols 4 Units
This course is an introduction to the Internet architecture. We will focus on the concepts and fundamental design principles that have contributed to the Internet’s scalability and robustness and survey the various protocols and algorithms used within this architecture. Topics include layering, addressing, intradomain routing, interdomain routing, reliable delivery, congestion control, and the core protocols (e.g., TCP, UDP, IP, DNS, and HTTP) and network technologies (e.g., Ethernet, wireless).
Rules & Requirements

Prerequisites: Computer Science 61B and 162

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Computer Science/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructors: Katz, Paxson, Ratnasamy, Shenker, Stoica

COMPSCI 169 Software Engineering 4 Units
Ideas and techniques for designing, developing, and modifying large software systems. Function-oriented and object-oriented modular design techniques, designing for re-use and maintainability. Specification and documentation. Verification and validation. Cost and quality metrics and estimation. Project team organization and management. Students will work in teams on a substantial programming project.
Rules & Requirements

Prerequisites: Computer Science 61B and 61C, and either Computer Science 70 or Mathematics 113

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Computer Science/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructors: Brewer, Fox, Necula, Sen

COMPSCI 170 Efficient Algorithms and Intractable Problems 4 Units
Concept and basic techniques in the design and analysis of algorithms; models of computation; lower bounds; algorithms for optimum search trees, balanced trees and UNION-FIND algorithms; numerical and algebraic algorithms; combinatorial algorithms. Turing machines, how to count steps, deterministic and nondeterministic Turing machines, NP-completeness. Unsolvable and intractable problems.
Rules & Requirements

Prerequisites: Computer Science 61B and 70

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Computer Science/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructors: Demmel, Papadimitriou, Rao, Wagner, Vazirani

COMPSCI 172 Computability and Complexity 4 Units
Finite automata, Turing machines and RAMs. Undecidable, exponential, and polynomial-time problems. Polynomial-time equivalence of all reasonable models of computation. Nondeterministic Turing machines. Theory of NP-completeness: Cook's theorem, NP-completeness of basic problems. Selected topics in language theory, complexity and randomness.
Rules & Requirements

Prerequisites: 170

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Computer Science/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructors: Papadimitriou, Seshia, Sinclair, Vazirani

COMPSCI 174 Combinatorics and Discrete Probability 4 Units
Permutations, combinations, principle of inclusion and exclusion, generating functions, Ramsey theory. Expectation and variance, Chebychev's inequality, Chernov bounds. Birthday paradox, coupon collector's problem, Markov chains and entropy computations, universal hashing, random number generation, random graphs and probabilistic existence bounds.
Rules & Requirements

Prerequisites: 170

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Computer Science/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructors: Bartlett, Papadimitriou, Sinclair, Vazirani

COMPSCI 176 Algorithms for Computational Biology 4 Units
Algorithms and probabilistic models that arise in various computational biology applications: suffix trees, suffix arrays, pattern matching, repeat finding, sequence alignment, phylogenetics, genome rearrangements, hidden Markov models, gene finding, motif finding, stochastic context free grammars, RNA secondary structure. There are no biology prerequisites for this course, but a strong quantitative background will be essential.
Rules & Requirements

Prerequisites: Computer Science 70 and 170. Experience programming in a language such as C, C++, Java, or Python

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Computer Science/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Song

COMPSCI 184 Foundations of Computer Graphics 4 Units
Techniques of modeling objects for the purpose of computer rendering: boundary representations, constructive solids geometry, hierarchical scene descriptions. Mathematical techniques for curve and surface representation. Basic elements of a computer graphics rendering pipeline; architecture of modern graphics display devices. Geometrical transformations such as rotation, scaling, translation, and their matrix representations. Homogeneous coordinates, projective and perspective transformations. Algorithms for clipping, hidden surface removal, rasterization, and anti-aliasing. Scan-line based and ray-based rendering algorithms. Lighting models for reflection, refraction, transparency.
Rules & Requirements

Prerequisites: Computer Science 61B or 61BL; programming skills in C, C++, or Java; linear algebra and calculus

Credit Restrictions: Students will receive no credit for Comp Sci 184 after taking Comp Sci 284A.

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Computer Science/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructors: O'Brien, Sequin, Barsky, Ramamoorthi, Agrawala

COMPSCI 186 Introduction to Database Systems 4 Units
Access methods and file systems to facilitate data access. Hierarchical, network, relational, and object-oriented data models. Query languages for models. Embedding query languages in programming languages. Database services including protection, integrity control, and alternative views of data. High-level interfaces including application generators, browsers, and report writers. Introduction to transaction processing. Database system implementation to be done as term project.
Rules & Requirements

Prerequisites: 61B and 61C

Credit Restrictions: Students will receive no credit for Comp Sci 186 after taking Comp Sci 286A.

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Computer Science/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructors: Franklin, Hellerstein

COMPSCI 188 Introduction to Artificial Intelligence 4 Units
Ideas and techniques underlying the design of intelligent computer systems. Topics include search, game playing, knowledge representation, inference, planning, reasoning under uncertainty, machine learning, robotics, perception, and language understanding.
Rules & Requirements

Prerequisites: Computer Science 61A; Computer Science 61B; Computer Science 70

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Summer: 8 weeks - 6 hours of lecture and 2 hours of discussion per week

Additional Details

Subject/Course Level: Computer Science/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructors: Abbeel, Klein, Russell

COMPSCI 189 Introduction to Machine Learning 4 Units
Theoretical foundations, algorithms, methodologies, and applications for machine learning. Topics may include supervised methods for regression and classication (linear models, trees, neural networks, ensemble methods, instance-based methods); generative and discriminative probabilistic models; Bayesian parametric learning; density estimation and clustering; Bayesian networks; time series models; dimensionality reduction; programming projects covering a variety of real-world applications.
Rules & Requirements

Prerequisites: Mathematics 53 and 54; Computer Science 70; Computer Science 188 or consent of instructor

Credit Restrictions: Students will receive no credit for Comp Sci 189 after taking Comp Sci 289A.

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Computer Science/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructors: Abbeel, Bartlett, Darrell, El Ghaoui, Jordan, Klein, Malik, Russell

COMPSCI C191 Quantum Information Science and Technology 3 Units
This multidisciplinary course provides an introduction to fundamental conceptual aspects of quantum mechanics from a computational and informational theoretic perspective, as well as physical implementations and technological applications of quantum information science. Basic sections of quantum algorithms, complexity, and cryptography, will be touched upon, as well as pertinent physical realizations from nanoscale science and engineering.
Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Computer Science/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructors: Crommie, Vazirani, Whaley

Also listed as: CHEM C191/PHYSICS C191

COMPSCI 194 Special Topics 1 - 4 Units
Topics will vary semester to semester. See the Computer Science Division announcements.
Rules & Requirements

Prerequisites: Consent of instructor

Repeat rules: Course may be repeated for credit as topic varies. Course may be repeated for credit when topic changes.

Hours & Format

Fall and/or spring: 15 weeks - 1-4 hours of lecture per week

Additional Details

Subject/Course Level: Computer Science/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

COMPSCI 195 Social Implications of Computer Technology 1 Unit
Topics include electronic community; the changing nature of work; technological risks; the information economy; intellectual property; privacy; artificial intelligence and the sense of self; pornography and censorship; professional ethics. Students will lead discussions on additional topics.
Rules & Requirements

Credit Restrictions: Students will receive no credit for 195 after taking C195/Interdisciplinary Field Study C155 or H195.

Hours & Format

Fall and/or spring: 15 weeks - 1.5 hours of lecture per week

Additional Details

Subject/Course Level: Computer Science/Undergraduate

Grading/Final exam status: Offered for pass/not pass grade only. Final exam not required.

Instructor: Harvey

COMPSCI H195 Honors Social Implications of Computer Technology 3 Units
Topics include electronic community; the changing nature of work; technological risks; the information economy; intellectual property; privacy; artificial intelligence and the sense of self; pornography and censorship; professional ethics. Students may lead discussions on additional topics.
Rules & Requirements

Credit Restrictions: Student will receive no credit for H195 after taking 195 or C195.

Hours & Format

Fall and/or spring: 15 weeks - 1.5 hours of lecture and 1.5 hours of discussion per week

Additional Details

Subject/Course Level: Computer Science/Undergraduate

Grading/Final exam status: Offered for pass/not pass grade only. Final exam not required.

Instructor: Harvey

COMPSCI H196A Senior Honors Thesis Research 1 - 4 Units
Thesis work under the supervision of a faculty member. To obtain credit the student must, at the end of two semesters, submit a satisfactory thesis to the Electrical Engineering and Computer Science department archive. A total of four units must be taken. The units many be distributed between one or two semesters in any way. H196A-H196B count as graded technical elective units, but may not be used to satisfy the requirement for 27 upper division technical units in the College of Letters and Science with a major in Computer Science.
Rules & Requirements

Prerequisites: Open only to students in the computer science honors program

Hours & Format

Fall and/or spring: 15 weeks - 1-4 hours of independent study per week

Additional Details

Subject/Course Level: Computer Science/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

COMPSCI H196B Senior Honors Thesis Research 1 - 4 Units
Thesis work under the supervision of a faculty member. To obtain credit the student must, at the end of two semesters, submit a satisfactory thesis to the Electrical Engineering and Computer Science department archive. A total of four units must be taken. The units many be distributed between one or two semesters in any way. H196A-H196B count as graded technical elective units, but may not be used to satisfy the requirement for 27 upper division technical units in the College of Letters and Science with a major in Computer Science.
Rules & Requirements

Prerequisites: Open only to students in the computer science honors program

Hours & Format

Fall and/or spring: 15 weeks - 1-4 hours of independent study per week

Additional Details

Subject/Course Level: Computer Science/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

COMPSCI 197 Field Study 1 - 4 Units
Students take part in organized individual field sponsored programs with off-campus companies or tutoring/mentoring relevant to specific aspects and applications of computer science on or off campus. Note Summer CPT or OPT students: written report required. Course does not count toward major requirements, but will be counted in the cumulative units toward graduation.
Rules & Requirements

Prerequisites: Consent of instructor (see department adviser)

Repeat rules: Course may be repeated for credit. Course may be repeated for credit when topic changes.

Hours & Format

Fall and/or spring: 15 weeks - 1-4 hours of fieldwork per week

Summer:
6 weeks - 2.5-10 hours of fieldwork per week
8 weeks - 2-7.5 hours of fieldwork per week

Additional Details

Subject/Course Level: Computer Science/Undergraduate

Grading/Final exam status: Offered for pass/not pass grade only. Final exam not required.

COMPSCI 198 Directed Group Studies for Advanced Undergraduates 1 - 4 Units
Group study of selected topics in Computer Sciences, usually relating to new developments.
Rules & Requirements

Prerequisites: 2.0 GPA or better; 60 units completed

Repeat rules: Course may be repeated for credit. Course may be repeated for credit when topic changes.

Hours & Format

Fall and/or spring: 15 weeks - 1-4 hours of directed group study per week

Additional Details

Subject/Course Level: Computer Science/Undergraduate

Grading/Final exam status: Offered for pass/not pass grade only. Final exam not required.

COMPSCI 199 Supervised Independent Study 1 - 4 Units
Supervised independent study. Enrollment restrictions apply.
Rules & Requirements

Prerequisites: Consent of instructor and major adviser

Credit Restrictions: Enrollment is restricted; see the Introduction to Courses and Curricula section of this catalog.

Repeat rules: Course may be repeated for credit when topic changes.

Hours & Format

Fall and/or spring: 15 weeks - 0 hours of independent study per week

Summer:
6 weeks - 1-5 hours of independent study per week
8 weeks - 1-4 hours of independent study per week

Additional Details

Subject/Course Level: Computer Science/Undergraduate

Grading/Final exam status: Offered for pass/not pass grade only. Final exam not required.

COMPSCI C219D Concurrent Models of Computation 3 Units
Theory and practice of concurrent models of computation (MoCs) with applications to software systems, embedded systems, and cyber-physical systems. Analysis for boundedness, deadlock, and determinacy; formal semantics (fixed point semantics and metric-space models); composition; heterogeneity; and model-based design. MoCs covered may include process networks, threads, message passing, synchronous/reactive, dataflow, rendezvous, time-triggered, discrete events, and continuous time.
Rules & Requirements

Repeat rules: Course may be repeated for credit with consent of instructor. Course may be repeated for credit when topic changes.

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Computer Science/Graduate

Grading: Letter grade.

Instructor: Lee

Also listed as: EL ENG C219D

COMPSCI C249A Introduction to Embedded Systems 4 Units
This course introduces students to the basics of models, analysis tools, and control for embedded systems operating in real time. Students learn how to combine physical processes with computation. Topics include models of computation, control, analysis and verification, interfacing with the physical world, mapping to platforms, and distributed embedded systems. The course has a strong laboratory component, with emphasis on a semester-long sequence of projects.
Rules & Requirements

Credit Restrictions: Students will receive no credit for El Eng/Comp Sci C249A after taking El Eng/Comp Sci C149.

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 3 hours of laboratory per week

Additional Details

Subject/Course Level: Computer Science/Graduate

Grading: Letter grade.

Instructors: Lee, Seshia

Formerly known as: Electrical Engineering C249M/Computer Science C249M

Also listed as: EL ENG C249A

COMPSCI 250 VLSI Systems Design 4 Units
Unified top-down and bottom-up design of integrated circuits and systems concentrating on architectural and topological issues. VLSI architectures, systolic arrays, self-timed systems. Trends in VLSI development. Physical limits. Tradeoffs in custom-design, standard cells, gate arrays. VLSI design tools.
Rules & Requirements

Prerequisites: 150

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 4 hours of laboratory per week

Additional Details

Subject/Course Level: Computer Science/Graduate

Grading: Letter grade.

Instructor: Wawrzynek

COMPSCI 252 Graduate Computer Architecture 4 Units
Graduate survey of contemporary computer organizations covering: early systems, CPU design, instruction sets, control, processors, busses, ALU, memory, I/O interfaces, connection networks, virtual memory, pipelined computers, multiprocessors, and case studies. Term paper or project is required.
Rules & Requirements

Prerequisites: 152

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Computer Science/Graduate

Grading: Letter grade.

Instructors: Culler, Kubiatowicz, Patterson

COMPSCI 260A User Interface Design and Development 4 Units
The design, implementation, and evaluation of user interfaces. User-centered design and task analysis. Conceptual models and interface metaphors. Usability inspection and evaluation methods. Analysis of user study data. Input methods (keyboard, pointing, touch, tangible) and input models. Visual design principles. Interface prototyping and implementation methodologies and tools. Students will develop a user interface for a specific task and target user group in teams.
Rules & Requirements

Prerequisites: Computer Science 61B, 61BL, or consent of instructor

Credit Restrictions: Students will receive no credit for Computer Science 260A after taking Computer Science 160.

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Computer Science/Graduate

Grading: Letter grade.

Instructors: Agrawala, Canny, Hartmann

COMPSCI 260B Human-Computer Interaction Research 3 Units
This course is a broad introduction to conducting research in Human-Computer Interaction. Students will become familiar with seminal and recent literature; learn to review and critique research papers; re-implement and evaluate important existing systems; and gain experience in conducting research. Topics include input devices, computer-supported cooperative work, crowdsourcing, design tools, evaluation methods, search and mobile interfaces, usable security, help and tutorial systems.
Rules & Requirements

Prerequisites: Computer Science 160 recommended, or consent of instructor

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Computer Science/Graduate

Grading: Letter grade.

Instructor: Hartmann

COMPSCI 261 Security in Computer Systems 3 Units
Graduate survey of modern topics in computer security, including protection, access control, distributed access security, firewalls, secure coding practices, safe languages, mobile code, and case studies from real-world systems. May also cover cryptographic protocols, privacy and anonymity, and/or other topics as time permits.
Rules & Requirements

Prerequisites: 162

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Computer Science/Graduate

Grading: Letter grade.

Instructors: D. Song, Wagner

COMPSCI 261N Internet and Network Security 4 Units
Develops a thorough grounding in Internet and network security suitable for those interested in conducting research in the area or those more broadly interested in security or networking. Potential topics include denial-of-service; capabilities; network intrusion detection/prevention; worms; forensics; scanning; traffic analysis; legal issues; web attacks; anonymity; wireless and networked devices; honeypots; botnets; scams; underground economy; attacker infrastructure; research pitfalls.
Rules & Requirements

Prerequisites: Electrical Engineering 122 or equivalent; Computer Science 161 or familiarity with basic security concepts

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Computer Science/Graduate

Grading: Letter grade.

Instructor: Paxson

COMPSCI 262A Advanced Topics in Computer Systems 4 Units
Graduate survey of systems for managing computation and information, covering a breadth of topics: early systems; volatile memory management, including virtual memory and buffer management; persistent memory systems, including both file systems and transactional storage managers; storage metadata, physical vs. logical naming, schemas, process scheduling, threading and concurrency control; system support for networking, including remote procedure calls, transactional RPC, TCP, and active messages; security infrastructure; extensible systems and APIs; performance analysis and engineering of large software systems. Homework assignments, exam, and term paper or project required.
Rules & Requirements

Prerequisites: 162 and entrance exam

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Computer Science/Graduate

Grading: Letter grade.

Instructors: Brewer, Hellerstein

Formerly known as: 262

COMPSCI 262B Advanced Topics in Computer Systems 3 Units
Continued graduate survey of large-scale systems for managing information and computation. Topics include basic performance measurement; extensibility, with attention to protection, security, and management of abstract data types; index structures, including support for concurrency and recovery; parallelism, including parallel architectures, query processing and scheduling; distributed data management, including distributed and mobile file systems and databases; distributed caching; large-scale data analysis and search. Homework assignments, exam, and term paper or project required.
Rules & Requirements

Prerequisites: 262A

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Computer Science/Graduate

Grading: Letter grade.

Instructors: Brewer, Culler, Hellerstein, Joseph

COMPSCI 263 Design of Programming Languages 3 Units
Selected topics from: analysis, comparison, and design of programming languages, formal description of syntax and semantics, advanced programming techniques, structured programming, debugging, verification of programs and compilers, and proofs of correctness.
Rules & Requirements

Prerequisites: 164

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Computer Science/Graduate

Grading: Letter grade.

Instructor: Necula

COMPSCI 264 Implementation of Programming Languages 4 Units
Compiler construction. Lexical analysis, syntax analysis. Semantic analysis code generation and optimization. Storage management. Run-time organization.
Rules & Requirements

Prerequisites: 164, 263 recommended

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture, 1 hour of discussion, and 6 hours of laboratory per week

Additional Details

Subject/Course Level: Computer Science/Graduate

Grading: Letter grade.

Instructor: Bodik

COMPSCI 265 Compiler Optimization and Code Generation 3 Units
Table-driven and retargetable code generators. Register management. Flow analysis and global optimization methods. Code optimization for advanced languages and architectures. Local code improvement. Optimization by program transformation. Selected additional topics. A term paper or project is required.
Rules & Requirements

Prerequisites: 164

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Computer Science/Graduate

Grading: Letter grade.

Instructor: Sen

COMPSCI C267 Applications of Parallel Computers 3 Units
Models for parallel programming. Fundamental algorithms for linear algebra, sorting, FFT, etc. Survey of parallel machines and machine structures. Exiting parallel programming languages, vectorizing compilers, environments, libraries and toolboxes. Data partitioning techniques. Techniques for synchronization and load balancing. Detailed study and algorithm/program development of medium sized applications.
Rules & Requirements

Repeat rules: Course may be repeated for credit when topic changes.

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of laboratory per week

Additional Details

Subject/Course Level: Computer Science/Graduate

Grading: Letter grade.

Instructors: Demmel, Yelick

Also listed as: ENGIN C233

COMPSCI 268 Computer Networks 3 Units
Distributed systems, their notivations, applications, and organization. The network component. Network architectures. Local and long-haul networks, technologies, and topologies. Data link, network, and transport protocols. Point-to-point and broadcast networks. Routing and congestion control. Higher-level protocols. Naming. Internetworking. Examples and case studies.
Rules & Requirements

Prerequisites: 162

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Computer Science/Graduate

Grading: Letter grade.

Instructors: Joseph, Katz, Stoica

Formerly known as: 292V

COMPSCI 270 Combinatorial Algorithms and Data Structures 3 Units
Design and analysis of efficient algorithms for combinatorial problems. Network flow theory, matching theory, matroid theory; augmenting-path algorithms; branch-and-bound algorithms; data structure techniques for efficient implementation of combinatorial algorithms; analysis of data structures; applications of data structure techniques to sorting, searching, and geometric problems.
Rules & Requirements

Prerequisites: 170

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Computer Science/Graduate

Grading: Letter grade.

Instructors: Papadimitriou, Rao, Sinclair, Vazirani

COMPSCI 271 Randomness and Computation 3 Units
Computational applications of randomness and computational theories of randomness. Approximate counting and uniform generation of combinatorial objects, rapid convergence of random walks on expander graphs, explicit construction of expander graphs, randomized reductions, Kolmogorov complexity, pseudo-random number generation, semi-random sources.
Rules & Requirements

Prerequisites: 170 and at least one course numbered 270-279

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Computer Science/Graduate

Grading: Letter grade.

Instructor: Sinclair

COMPSCI 273 Foundations of Parallel Computation 3 Units
. Fundamental theoretical issues in designing parallel algorithms and architectures. Shared memory models of parallel computation. Parallel algorithms for linear algegra, sorting, Fourier Transform, recurrence evaluation, and graph problems. Interconnection network based models. Algorithm design techniques for networks like hypercubes, shuffle-exchanges, threes, meshes and butterfly networks. Systolic arrays and techniques for generating them. Message routing.
Rules & Requirements

Prerequisites: 170, or consent of instructor

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Computer Science/Graduate

Grading: Letter grade.

Instructor: Rao

COMPSCI 274 Computational Geometry 3 Units
. Constructive problems in computational geometry: convex hulls, triangulations, Voronoi diagrams, arrangements of hyperplanes; relationships among these problems. Search problems: advanced data structures; subdivision search; various kinds of range searches. Models of computation; lower bounds.
Rules & Requirements

Prerequisites: 170 or equivalent

Repeat rules: Course may be repeated for credit. Course may be repeated for credit when topic changes.

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Computer Science/Graduate

Grading: Letter grade.

Instructor: Shewchuk

COMPSCI 276 Cryptography 3 Units
Graduate survey of modern topics on theory, foundations, and applications of modern cryptography. One-way functions; pseudorandomness; encryption; authentication; public-key cryptosystems; notions of security. May also cover zero-knowledge proofs, multi-party cryptographic protocols, practical applications, and/or other topics, as time permits.
Rules & Requirements

Prerequisites: 170

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Computer Science/Graduate

Grading: Letter grade.

Instructors: Trevisan, Wagner

COMPSCI C280 Computer Vision 3 Units
Paradigms for computational vision. Relation to human visual perception. Mathematical techniques for representing and reasoning, with curves, surfaces and volumes. Illumination and reflectance models. Color perception. Image segmentation and aggregation. Methods for bottom-up three dimensional shape recovery: Line drawing analysis, stereo, shading, motion, texture. Use of object models for prediction and recognition.
Rules & Requirements

Prerequisites: Knowledge of linear algebra and calculus. Mathematics 1A-1B, 53, 54 or equivalent

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Computer Science/Graduate

Grading: Letter grade.

Instructor: Malik

Also listed as: VIS SCI C280

COMPSCI C281A Statistical Learning Theory 3 Units
Classification regression, clustering, dimensionality, reduction, and density estimation. Mixture models, hierarchical models, factorial models, hidden Markov, and state space models, Markov properties, and recursive algorithms for general probabilistic inference nonparametric methods including decision trees, kernal methods, neural networks, and wavelets. Ensemble methods.
Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Computer Science/Graduate

Grading: Letter grade.

Instructors: Bartlett, Jordan, Wainwright

Also listed as: STAT C241A

COMPSCI C281B Advanced Topics in Learning and Decision Making 3 Units
Recent topics include: Graphical models and approximate inference algorithms. Markov chain Monte Carlo, mean field and probability propagation methods. Model selection and stochastic realization. Bayesian information theoretic and structural risk minimization approaches. Markov decision processes and partially observable Markov decision processes. Reinforcement learning.
Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Computer Science/Graduate

Grading: Letter grade.

Instructors: Bartlett, Jordan, Wainwright

Also listed as: STAT C241B

COMPSCI 284A Foundations of Computer Graphics 4 Units
Techniques of modeling objects for the purpose of computer rendering: boundary representations, constructive solids geometry, hierarchical scene descriptions. Mathematical techniques for curve and surface representation. Basic elements of a computer graphics rendering pipeline; architecture of modern graphics display devices. Geometrical transformations such as rotation, scaling, translation, and their matrix representations. Homogeneous coordinates, projective and perspective transformations.
Rules & Requirements

Prerequisites: Computer Science 61B or 61BL; programming skills in C, C++, or Java; linear algebra and calculus; or consent of instructor

Credit Restrictions: Students will receive no credit for Computer Science 284A after taking 184.

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Computer Science/Graduate

Grading: Letter grade.

Instructors: Agrawala, Barsky, O'Brien, Ramamoorthi, Sequin

COMPSCI 284B Advanced Computer Graphics Algorithms and Techniques 4 Units
This course provides a graduate-level introduction to advanced computer graphics algorithms and techniques. Students should already be familiar with basic concepts such as transformations, scan-conversion, scene graphs, shading, and light transport. Topics covered in this course include global illumination, mesh processing, subdivision surfaces, basic differential geometry, physically based animation, inverse kinematics, imaging and computational photography, and precomputed light transport.
Rules & Requirements

Prerequisites: 184 or equivalent

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Computer Science/Graduate

Grading: Letter grade.

Instructors: O'Brien, Ramamoorthi

Formerly known as: Computer Science 283

COMPSCI 286A Introduction to Database Systems 4 Units
Access methods and file systems to facilitate data access. Hierarchical, network, relational, and object-oriented data models. Query languages for models. Embedding query languages in programming languages. Database services including protection, integrity control, and alternative views of data. High-level interfaces including application generators, browsers, and report writers. Introduction to transaction processing. Database system implementation to be done as term project.
Rules & Requirements

Prerequisites: Computer Science 61B and 61C

Credit Restrictions: Students will receive no credit for CS 286A after taking CS 186.

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Computer Science/Graduate

Grading: Letter grade.

Instructors: Franklin, Hellerstein

COMPSCI 286B Implementation of Data Base Systems 3 Units
Implementation of data base systems on modern hardware systems. Considerations concerning operating system design, including buffering, page size, prefetching, etc. Query processing algorithms, design of crash recovery and concurrency control systems. Implementation of distributed data bases and data base machines.
Rules & Requirements

Prerequisites: Computer Science 162 and 186 or 286A

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Computer Science/Graduate

Grading: Letter grade.

Instructors: Franklin, Hellerstein

COMPSCI 287 Advanced Robotics 3 Units
Advanced topics related to current research in robotics. Planning and control issues for realistic robot systems, taking into account: dynamic constraints, control and sensing uncertainty, and non-holonomic motion constraints. Analysis of friction for assembly and grasping tasks. Sensing systems for hands including tactile and force sensing. Environmental perception from sparse sensors for dextrous hands. Grasp planning and manipulation.
Rules & Requirements

Prerequisites: Electrical Engineering 125

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Computer Science/Graduate

Grading: Letter grade.

Instructor: Abbeel

COMPSCI 288 Natural Language Processing 4 Units
Methods and models for the analysis of natural (human) language data. Topics include: language modeling, speech recognition, linguistic analysis (syntactic parsing, semantic analysis, reference resolution, discourse modeling), machine translation, information extraction, question answering, and computational linguistics techniques.
Rules & Requirements

Prerequisites: CS188 required, CS170 recommended

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Computer Science/Graduate

Grading: Letter grade.

Instructor: Klein

COMPSCI 289A Introduction to Machine Learning 4 Units
This course provides an introduction to theoretical foundations, algorithms, and methodologies for machine learning, emphasizing the role of probability and optimization and exploring a variety of real-world applications. Students are expected to have a solid foundation in calculus and linear algebra as well as exposure to the basic tools of logic and probability, and should be familiar with at least one modern, high-level programming language.
Rules & Requirements

Prerequisites: Mathematics 53, 54; Computer Science 70; Computer Science 188 or consent of instructor

Credit Restrictions: Students will receive no credit for Comp Sci 289A after taking Comp Sci 189.

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Computer Science/Graduate

Grading: Letter grade.

Instructors: Abbeel, Bartlett, Darrell, El Ghaoui, Jordan, Klein, Malik, Russell

COMPSCI 294 Special Topics 1 - 4 Units
Topics will vary from semester to semester. See Computer Science Division announcements.
Rules & Requirements

Repeat rules: Course may be repeated for credit. Course may be repeated for credit when topic changes.

Hours & Format

Fall and/or spring:
4 weeks - 3-15 hours of lecture per week
6 weeks - 3-9 hours of lecture per week
8 weeks - 2-6 hours of lecture per week
10 weeks - 2-5 hours of lecture per week
15 weeks - 1-3 hours of lecture per week

Additional Details

Subject/Course Level: Computer Science/Graduate

Grading: Letter grade.

COMPSCI 297 Field Studies in Computer Science 1 - 12 Units
Supervised experience in off-campus companies relevant to specific aspects and applications of electrical engineering and/or computer science. Written report required at the end of the semester.
Rules & Requirements

Repeat rules: Course may be repeated for credit. Course may be repeated for credit when topic changes.

Hours & Format

Fall and/or spring: 15 weeks - 1-12 hours of independent study per week

Summer:
6 weeks - 2.5-30 hours of independent study per week
8 weeks - 1.5-22.5 hours of independent study per week
10 weeks - 1.5-18 hours of independent study per week

Additional Details

Subject/Course Level: Computer Science/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

COMPSCI 298 Group Studies Seminars, or Group Research 1 - 4 Units
Advanced study in various subjects through seminars on topics to be selected each year, informal group studies of special problems, group participation in comprehensive design problems, or group research on complete problems for analysis and experimentation.
Rules & Requirements

Repeat rules: Course may be repeated for credit. Course may be repeated for credit when topic changes.

Hours & Format

Fall and/or spring: 15 weeks - 1-4 hours of lecture per week

Additional Details

Subject/Course Level: Computer Science/Graduate

Grading: The grading option will be decided by the instructor when the class is offered.

COMPSCI 299 Individual Research 1 - 12 Units
Investigations of problems in computer science.
Rules & Requirements

Repeat rules: Course may be repeated for credit. Course may be repeated for credit when topic changes.

Hours & Format

Fall and/or spring: 15 weeks - 0-1 hours of independent study per week

Summer:
6 weeks - 8-30 hours of independent study per week
8 weeks - 6-22.5 hours of independent study per week
10 weeks - 1.5-18 hours of independent study per week

Additional Details

Subject/Course Level: Computer Science/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

COMPSCI 300 Teaching Practice 1 - 6 Units
Supervised teaching practice, in either a one-on-one tutorial or classroom discussion setting.
Rules & Requirements

Repeat rules: Course may be repeated for credit. Course may be repeated for credit when topic changes.

Hours & Format

Fall and/or spring: 15 weeks - 0 hours of independent study per week

Summer:
6 weeks - 1-5 hours of independent study per week
8 weeks - 1-4 hours of independent study per week

Additional Details

Subject/Course Level: Computer Science/Professional course for teachers or prospective teachers

Grading: Offered for satisfactory/unsatisfactory grade only.

COMPSCI 302 Designing Computer Science Education 3 Units
Discussion and review of research and practice relating to the teaching of computer science: knowledge organization and misconceptions, curriculum and topic organization, evaluation, collaborative learning, technology use, and administrative issues. As part of a semester-long project to design a computer science course, participants invent and refine a variety of homework and exam activities, and evaluate alternatives for textbooks, grading and other administrative policies, and innovative uses of technology.
Rules & Requirements

Prerequisites: Computer Science 301 and two semesters of GSI experience

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of lecture per week

Additional Details

Subject/Course Level: Computer Science/Professional course for teachers or prospective teachers

Grading: Letter grade.

Instructor: Garcia

COMPSCI 375 Teaching Techniques for Computer Science 2 Units
Discussion and practice of techniques for effective teaching, focusing on issues most relevant to teaching assistants in computer science courses.
Rules & Requirements

Prerequisites: Consent of instructor

Repeat rules: Course may be repeated for credit. Course may be repeated for credit when topic changes.

Hours & Format

Fall and/or spring: 10 weeks - 3 hours of discussion per week

Summer: 8 weeks - 4 hours of discussion per week

Additional Details

Subject/Course Level: Computer Science/Professional course for teachers or prospective teachers

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructors: Barsky, Garcia, Harvey

COMPSCI 399 Professional Preparation: Supervised Teaching of Computer Science 1 or 2 Units
Discussion, problem review and development, guidance of computer science laboratory sections, course development, supervised practice teaching.
Rules & Requirements

Prerequisites: Appointment as graduate student instructor

Repeat rules: Course may be repeated for credit. Course may be repeated for credit when topic changes.

Hours & Format

Fall and/or spring: 15 weeks - 1-2 hours of independent study per week

Summer: 8 weeks - 1-2 hours of independent study per week

Additional Details

Subject/Course Level: Computer Science/Professional course for teachers or prospective teachers

Grading: Offered for satisfactory/unsatisfactory grade only.

COMPSCI 602 Individual Study for Doctoral Students 1 - 8 Units
Individual study in consultation with the major field adviser, intended to provide an opportunity for qualified students to prepare themselves for the various examinations required of candidates for the Ph.D. (and other doctoral degrees).
Rules & Requirements

Credit Restrictions: Course does not satisfy unit or residence requirements for doctoral degree.

Repeat rules: Course may be repeated for credit. Course may be repeated for credit when topic changes.

Hours & Format

Fall and/or spring: 15 weeks - 0 hours of independent study per week

Summer: 8 weeks - 6-45 hours of independent study per week

Additional Details

Subject/Course Level: Computer Science/Graduate examination preparation

Grading: Offered for satisfactory/unsatisfactory grade only.