Computer Science (CS)

CS 101 Introduction to Computers and Computing (3)

Lecture, 2 hours; laboratory, 2 hours. This course is an introduction to the concepts, techniques, uses, applications, and terminology of computers, computing, and networking. Emphasis is on the possibilities and limitations of computers and computing in a wide range of personal, commercial, and organizational activities. Topics include computer types, history of computing, computer organization and operation, computer languages, program development, computer applications (word processing, database, graphics, spreadsheets, etc.), basic networking, and computers in society. Weekly hands-on experience with a variety of operating systems, applications, and computer programming. Not applicable to the CS major. Recommended for all students. Satisfies GE Area B3.

CS 115 Programming I (4)

Lecture, 3 hours; laboratory, 3 hours. This course gives an overview of computer organization; arithmetic and logical expressions, decision and iteration, simple I/O; subprograms; principles of good programming style, readability, documentation, structured programming concepts; top-down design and refinements; techniques of debugging and testing. Use of the above concepts will be implemented in a standard high-level programming language. Satisfies GE Area B3. Prerequisite: GE math and English eligibility, or consent of instructor.

CS 115W Programming I Workshop (1)

A workshop designed to be taken with CS 115. Exploration of programming concepts through problem solving in a group setting. Corequisite: CS 115.

CS 175 Introduction to Computer Graphics (3)

Lecture, 2 hours; laboratory, 2 hours. This is the first course in computer graphics hardware and software. Topics include graphics hardware, microcomputer graphics, presentation and business graphics, graphics for artists, computer mapping, CAD/CAM (drafting and environmental applications), animation, 3-dimensional graphics, and desktop publishing. Students will have hands-on experience using a variety of graphics programs on microcomputers. Not applicable to the CS major. Prerequisite: previous computer courses or consent of instructor.

CS 185 Special Topics in Computer Science (1-4)

Content will be indicated by the specific topic. Prerequisite: consent of instructor.

CS 210 Introduction to Unix (1)

Laboratory, 3 hours. This course is an introduction to the use of Linux/Unix as a programming environment. Communicating with a Unix host, shells and shell commands, files and directories, Gnome desktop, jobs and processes, scripting, programming utilities (compiler, linker, debugger, make, hex dump, etc.). Prerequisites: CS 115 and previous or concurrent enrollment in CS 215, or consent of instructor.

CS 215 Programming II (4)

Lecture, 3 hours; laboratory, 3 hours. This course is the sequel to CS 115. Topics include: pointers and dynamic allocation of storage, linked lists, an introduction to the object oriented programming (OOP) paradigm, classes and objects, encapsulation, member variables and member functions, inheritance and polymorphism, scoping, templates, iterators, and error handling techniques. Prerequisites: CS 115 and previous or concurrent enrollment in CS 210, or consent of instructor.

CS 242 Discrete Structures for Computer Science (4)

Lecture, 4 hours. This course covers fundamental mathematical concepts blended with their applications in Computer Science. Topics include: sets, functions and relations, Boolean algebra, normal forms., Karnaugh map and other minimization techniques, predicate logic, formal and informal proof techniques, relational algebra, basic counting techniques, recurrence relations, and an introduction to graph theory. Prerequisites: CS 115 and MATH 161 or 161X, or consent of instructor.

CS 252 Introduction to Computer Organization (4)

Lecture, 3 hours; laboratory 3 hours. This course looks at the interface between computer hardware and software by introducing computer architecture and low-level programming. Topics to be covered include: data representations, digital logic, combinational and sequential circuits, computer system organization from the machine language point of view, and assembly language implementation of high-level constructs. Prerequisites: CS 215 and CS 242, or consent of instructor.

CS 285 Selected Topics in Computer Science (1-4)

This lower-division course may be repeated with different subject matter. Content will be indicated by the specific topic. Prerequisite: as indicated in the specific topic description or consent of instructor.

CS 315 Data Structures (4)

Lecture, 3 hours; laboratory, 3 hours. This course introduces the concept of the organization of data into different structures to support the efficient implementation of computer algorithms. The emphasis of the course is on the internal representation of the elementary and intermediate data structures, their time and space requirements, and their applications. A second component of the course is the study of more advanced features of object-oriented programming. Prerequisite: CS 210, CS 215, and CS 242, or consent of instructor.

CS 330 Introduction to Game Programming (3)

Lecture, 2 hours; laboratory, 2 hours. This course is an introduction to the theory and practice of video game design and programming. Video games combine, in real-time, concepts in computer graphics, human-computer interaction, networking, artificial intelligence, computer aided instruction, computer architecture, and databases. This course introduces students to a variety of game engines and frameworks and explores artificially intelligent agents. Students will work as part of a team to create a complete description document for a computer game and implement a prototype of the game. Prerequisite: CS 315 or instructor consent.

CS 340 Computer Security and Malware (3)

Lecture, 2 hours; laboratory, 2 hours. Current methods for increasing security, protecting privacy, and guaranteeing degrees of confidentiality of computer records; ensuring computer installation safety; protecting software products; preventing and dealing with crime; value systems, ethics, and human factors affecting use and misuse of computers. Discussion of recent technical, legal, and sociopolitical issues influencing computer security problems, with an emphasis on malware. Prerequisites: CS 215 and CS 252, or consent of instructor.

CS 349 Problem Solving in a Team Environment (1)

Laboratory, 2 hours. This course focuses on problem solving and program development in a team programming environment. Topics include: techniques for problem analysis and algorithm design, rapid implementation and pair programming methods, use of standard container classes and library functions. Different types of problems will be selected each semester. May be repeated for credit. A maximum of 3 units can be applied to the Computer Science major. Prerequisite: CS 315 or consent of instructor. SSU students taking this course participate in regional and national programming competitions.

CS 351 Computer Architecture (4)

Lecture, 4 hours. This course is the sequel to CS 252 and includes the following topics: instruction set design; stages of instruction execution: data, and control path design; pipelining; program optimization techniques; memory hierarchy; cache models and design issues; virtual memory and secondary storage; I/O interfacing. Advanced topics to include some of the following: parallel architectures, DSP or other special purpose architecture, FPGA, reconfigurable architecture, and asynchronous circuit design. Prerequisites: CS 215 and CS 252, or consent of instructor.

CS 355 Database Management Systems Design (4)

Lecture, 4 hours. This course focuses on the theoretical as well as the practical aspects of modern database systems. Topics include the study of the entity-relationship (E/R) model, relational algebra, data normalization, XML as a semi-structured data model, data integrity, and database administration. Current tools and technologies are used to create and manipulate sample databases. Prerequisite: CS 215 or consent of instructor.

CS 360 Object-Oriented Programming (3)

Principles of object-oriented programming, including encapsulation, inheritance, polymorphism, and design patterns. Specific applications are developed in one or more object-oriented programming languages and will cover the use of application frameworks and graphical user interfaces based on object-oriented principles. Prerequisites: CS 315, or consent of instructor.

CS 365 Computer Networking and the Internet (3)

Lecture, 2 hours; laboratory, 3 hours. This course introduces the theory and practice of computer networking, with coverage of key theories in data communication and how these theories relate to current practices and will drive future practices. Network hardware implementations of local area networks, wide area networks, telephone networks, and wireless networks are investigated. Network software implementations of switches and routers, peer-to-peer networking, and hosted applications are investigated with exercises in writing and debugging network protocols in the laboratory. Prerequisites: CS 215 and CS 252, or consent of instructor.

CS 370 Software Design and Development (4)

Lecture, 4 hours. Techniques of software design and development. Software life cycle, requirements, formal specification, metrics, design, functional and structural testing, rapid prototyping, complexity, version control, and team management. Software metrics, tools for component-based software development. Team-based, agile, and scrum methodologies emphasized. Prerequisite: CS 215 or consent of instructor.

CS 375 Computer Graphics (3)

Lecture, 2 hours; Laboratory, 2 hours. An introduction to computer graphics. Survey of the fundamental algorithms and methodologies, including, but not limited to, polygon fill, line-drawing, antialiasing, geometric transformations, viewing and clipping, spline representation, occlusion and visible surface detection, illumination, texturing, color models, rendering, shaders, animation, and emerging techniques. Prerequisites: CS 215 and MATH 161, or consent of instructor.

CS 380 ETS Major Field Test (1)

The focus of this course is preparation for the Major Field Test in Computer Science. Students will review material in the basic knowledge areas of computer science including: discrete structures, programming, algorithms and complexity, systems, software engineering, and information management. The course will culminate with students taking the Major Field Test in Computer Science administered through Educational Testing Services. This course is intended for students whom have completed the majority of required coursework in the CS major and are within one semester of graduation.

CS 385 Selected Topics in Computer Science (1-4)

This course may be repeated with different subject matter for credit in the CS major. Prerequisites: upper-division standing with consent of a CS advisor and consent of instructor.

CS 386 Selected Topics in CS with Lab (3)

Lecture 2 hours, lab 3 hours. This course may be repeated with different subject matter for credit in the CS major. Prerequisites: upper-division standing with consent of a CS advisor and consent of instructor.

CS 390 Computer Science Colloquium (1)

Series of lectures on current developments in computer science. May be repeated for credit; a maximum of 3 units can be applied to the CS major; students will be required to attend all presentations, take notes, and research each of these presentations. Contact the department for specific information. Cr/NC only.

CS 395 Community Involvement Program (1-4)

CIP involves students in basic community problems. The most common task for a CS student will be tutoring at a local school. Not applicable to the CS major. Prerequisites: CS 115 and consent of instructor.

CS 415 Algorithm Analysis (4)

Lecture, 4 hours. This course provides a systematic approach to the design and analysis of algorithms with an emphasis on efficiency. Topics include algorithms for searching and sorting, hashing, exploring graphs, and integer and polynomial arithmetic. Foundations in recurrence relations, combinatorics, probability, and graph theory as used in algorithm analysis are covered. Standard design techniques such as divide-and-conquer, greedy method, dynamic programming, heuristics, and probabilistic algorithms along with NP-completeness and approximation algorithms are included. Prerequisite: CS 315, or consent of instructor.

CS 425 Parallel Computing (3)

Lecture, 3 hours. Overview of parallel patterns, programming models, and hardware. Topics include parallel performance analysis; types of parallelism; parallel decomposition of tasks; shared vs. distributed memory; synchronization; hands-on experience with multiple parallel programming models; and architectural support for parallelism. Prerequisites: CS 252 and CS 315, or consent of instructor.

CS 450 Operating Systems (4)

Lecture, 4 hours. This course covers the fundamental concepts of operating system design and implementation; the study of problems, goals, and methods of concurrent programming; and the fundamentals of systems programming. Topics include resource-management, process and thread scheduling algorithms, interprocess communication, I/O subsystems and device-drivers, memory management including virtual memory, segmentation, and page-replacement policies. These topics will be covered in theory and in practice through the study of the source-code of a working operating system. Prerequisites: CS 252 and CS 315, or consent of instructor.

CS 452 Compiler Design and Construction (3)

Lecture, 2 hours; laboratory, 2 hours. Application of language and automata theory to the design and construction of compilers. Lexical scanning, top-down and bottom-up parsing; semantic analysis, code generation; optimization. Design and construction of parts of a simple compiler using compiler generation tools. Prerequisites: CS 315 and 252, or consent of instructor.

CS 454 Theory of Computation (4)

Lecture, 4 hours. Overview of various kinds of computability, unsolvability, and decidability. The P versus NP problem. Abstract mathematical models of computing devices and language specification systems with focus on regular and context-free languages. Classification of computer-solvable problems. Prerequisite: CS 315, or consent of instructor.

CS 460 Programming Languages (4)

Lecture, 4 hours. This course provides a survey of the syntactic, semantic, and implementation features of functional, procedural, object-oriented, logic, and concurrent programming languages. Prerequisites: CS 252 and CS 315, or consent of instructor.

CS 465 Data Communications (3)

Lecture, 2 hours; laboratory, 3 hours. The ISO reference model, theoretical basis for data communications, data transmission theory and practice, telephone systems, protocols, networks, internetworks, with examples. Prerequisite: CS 351, or consent of instructor.

CS 470 Advanced Software Design Project (3)

Lecture, 3 hours. This course is a project-based course designed to provide a "real world, team oriented" capstone experience for Computer Science majors. Coursework will be organized around large programming projects. The content of the projects may vary depending on the interests of the instructor and may include industry, government, nonprofit organization, or other affiliations. Prerequisites: CS 315, CS 370, and senior-standing in the major; or consent of instructor.

CS 480 Artificial Intelligence (3)

This course is a survey of techniques that simulate human intelligence. Topics may include: pattern recognition, general problem solving, adversarial game-tree search, decision-making, expert systems, neural networks, fuzzy logic, and genetic algorithms. Prerequisite: CS 315 or consent of instructor.

CS 495 Special Studies (1-4)

This course is intended for students who are doing advanced work in an area of computer science (e.g., a senior project). Prerequisites: an upper-division CS course in the area of interest and consent of instructor. May be repeated for credit.

CS 496 Senior Research Project (3)

Students, under the direction of one or more faculty members, undertake a substantial research project that is based on multiple upper-division CS courses. The result of the research is presented by the students in one of the Colloquium (CS 390) meetings. Senior-standing and approved contract are required.

CS 497 Internship (1-3)

Student projects conceived and designed in conjunction with an off-campus organization or group. The internship is intended to provide on-the-job experience in an area of computer science in which the student has no prior on-the-job experience. Computer hardware or computer time required for the internship, as well as regular supervision of the intern, must be provided by the off-campus organization. Prerequisite: student must be within 30 units of completion of the CS major. May be taken Cr/NC only. No more than 3 units can be applied to the CS major.

Counseling (COUN)

COUN 496 Migrant-Education Advisor Program (1-4)

School-based counseling experience supervised by Counseling department faculty. Under the guidance of the instructor, undergraduate students advise, counsel, and mentor K-12 students with a migrant background. Prerequisites: participation in the Migrant Education Advisor Program (MEAP) and consent of the instructor.

COUN 501 Counseling Theories and Professional Orientation (4)

An orientation to professional counseling focusing on standards of practice, major counseling theories, and essential concepts in the practice of counseling including attention to concepts of resilience and recovery-based models. Advocacy, systems of care, services, support for the severely mentally ill, and collaborative treatment are addressed in both counseling and case management. Mental health principles, the history and philosophy of counseling, consultation, self-care, cultural competence, roles of professional organizations and governing bodies, and ethical standards of the discipline are presented. This course also includes focus on 1 unit of special topics toward the CA LPCC license.

COUN 502 Whole Lifespan Development (4)

This course offers a developmental perspective on counseling interventions appropriately undertaken with children, adolescents, and adults. Objectives include: (1) providing students with an introduction to basic intervention strategies for counseling children and adolescents, taking into account cultural and socioeconomic influences; (2) familiarizing students with special topics, e.g., impact of divorce on children, child maltreatment, and effects of domestic violence; (3) consideration of family, peer, school, and community contexts in treatment planning (i.e., integrative case formulation) with children and adolescents; (4) identifying basic intervention strategies that facilitate adaptive change in adults' lives, particularly in the context of significant transitions and life events; (5) addressing long term care and elder abuse; (6) consideration of gender, sexual orientation, and ethnicity issues; and (7) examination of changes in career, interpersonal relationships, family structure and dynamics with an emphasis on their interdependence. This course also incorporates focus on 1 unit of special topics toward the CA LPCC license. Course restricted to Counseling M.A. students only.

COUN 503 Clinical Diagnosis and Treatment Planning (4)

A course designed to cover psychopathology and sociopolitical-related issues of diagnosis and treatment. Attention is given to: (1) understanding the variability of psychopathology in community counseling settings; (2) the application of evaluation methods and diagnostic classification systems of the Diagnostic and Statistical Manual of Mental and Emotional Disorders (DSM); (3) development of appropriate treatment plans; (4) the relationship of class, gender, and ethnic background to diagnosis and treatment; (5) mental health recovery-oriented care; (6) principles of collaborative treatment; and (7) the impact of co-occurring disorders. This course also includes a focus on 1 unit of special topics toward the CA LPCC license. Course restricted to Counseling M.A. students only.

COUN 510A Applied Counseling Techniques and Assessment (4)

This course helps students to develop necessary basic multiculturally competent assessment and counseling skills to prepare them for field based training experiences in a wide variety of settings. Students will learn interview and assessment methodologies including intake interviewing, crisis assessment, and suicide assessment. Training is done through the use of videotape feedback and in-class practice demonstrations involving personal disclosure, role-play, and group and instructor feedback. This course is normally taken in the first semester by new students. This course also includes focus on 2 units of special topics toward the California LPCC license. Course restricted to Counseling M.A. students only.