

Program

BS in Computer Science

BS in Computer Information Systems

Minor in Computer Science

Minor in Information Technology

MS in Computer Science

The undergraduate programs prepare students for careers in diverse areas of application of Computer Science. The MS program provides a strong graduate-level core foundation in Computer Science while also allowing exploration into other areas of interest in the discipline.

The department offers students the opportunity to earn the distinction of Honors in Computer Science or Honors in Computer Information Systems. This recognition appears on the permanent transcript and diploma. The Honors award confers a distinction that enhances opportunities for graduate school and employment.

Faculty and Facilities

The breadth of faculty expertise is evident from the many courses offered in operating systems and networks, programming languages, artificial intelligence, computer graphics, computer architecture, database systems, computer theory, and software engineering, and from the variety of professional consulting and research projects in which the faculty are involved.

The College of Engineering, Computer Science, and Construction Management (ECC) is housed in the O'Connell Technology Center. ECC maintains a large site to support its computing and technology needs. Currently, the College manages 19 labs with a combined total of more than 300 machines (not including machines in faculty and department offices), 16 servers and multiple operating systems, supporting approximately 20,000 users.

Computing facilities available to computer science majors include five general-purpose labs containing high-end PCs and thin-clients, with access to Windows XP, Vista, and UNIX and Linux servers. The department has a separate computer networks laboratory where students get hands-on experience in configuring and reconfiguring various types of networks and in the analysis of data obtained from network analyzers. The department houses the Institute for Research on Intelligent Systems (IRIS) and the Intelligent Systems Lab (ISL), providing robotics resources for curriculum, collaborative research, and outreach. The department is also a member of the Microsoft MSDN Academic Alliance, giving all students free access to Microsoft software development tools.

Student Organizations

Student chapters of the Association for Computing Machinery (ACM), Institute of Electrical and Electronics Engineers (IEEE), Society of Women Engineers (SWE), and the Upsilon Pi Epsilon (UPE) international honor society are active on campus. Additionally, the Chico State Linux User's Group (CSLUG), Network for Women in Technology (NeWT), Chico Java User's Group (Chico JUG), Chico Flex User Group (Chico FUG), Chico .NET User's Group, American Institute of Mechatronic Engineers (AIME) and the Computer Graphics Consortium (CGC) provide opportunities for various student activities.

Cooperative Work Experience

The computer industry holds the department in high regard, in part due to its active participation in the Cooperative Work Experience Program.



Students are placed with firms such as IBM, ChevronTexaco, SUN, and Hewlett-Packard, and various government laboratories. Selected students take a planned educational leave for a term and a summer (six to eight months) to work in their discipline and receive normal employee salary and academic credit for their valuable experience.

Career Outlook

According to the U.S. Department of Labor, Bureau of Labor Statistics, Career Guide to Industries, "the computer systems design and related services industry is expected to experience rapid growth, adding 489,000 jobs between 2006 and 2016. Professional and related workers will enjoy the best job prospects, reflecting continuing demand for higher level skills needed to keep up with changes in technology."

Occupations that are expected to grow rapidly include network systems and data communications analysts, software engineers, computer systems analysts, and network and computer systems administrators. Information on particular occupations may be found in the BLS Occupational Outlook Handbook.

Graduates of the BS or MS programs can look forward to a stimulating variety of career opportunities, as employment prospects for trained computer scientists are expected to remain very high. The Minor in Computer Science or the Minor in Information Technology will benefit students of all disciplines, given the current trend toward hiring graduates who have strong technology skills.

Accreditation

The BS in Computer Science degree program is accredited by the Computing Accreditation Commission of ABET, 111 Market Place, Suite 1050, Baltimore, MD 21202-4012, telephone: (410) 347-7700.



Computer Science

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Undergraduate Coordinator:

Judith Challenger

Graduate Coordinator: Abdel-Moaty Fayek

The Bachelor of Science in Computer Science

Total Course Requirements for the Bachelor's Degree: 128 units

See "Requirements for the Bachelor's Degree" in the *University Catalog* for complete details on general degree requirements. A minimum of 40 units, including those required for the major, must be upper division.

A suggested Major Academic Plan (MAP) has been prepared to help students meet all graduation requirements within four years. Please request a plan from your major advisor or view it and other current advising information at <http://em.csuchico.edu/aap/ProgramSearch>.

General Education Requirements: 48 units

See "General Education Requirements" in the University Catalog and the Class Schedule for the most current information on General Education Requirements and course offerings. The course requirements marked below with an asterisk (*) may also be applied toward General Education.

HIST 130 may be used to fulfill any one of the Breadth Area C1, C2, or C3 requirements and POLS 155 may be used to fulfill any one of the Breadth Area D1, D2, or D3 requirements.

Upper-division theme modification has been approved for this major. See the General Education chapter in the *University Catalog* for specifics on how to apply this modification.

Diversity Course Requirements: 6 units

See "Diversity Requirement" in the University Catalog. Most courses taken to satisfy these requirements may also apply to General Education.

U.S. History, Constitution, and American Ideals: 6 units

See "U.S. History, Constitution, and American Ideals" under "Bachelor's Degree Requirements". For this major, this requirement is normally fulfilled by completing HIST 130 and POLS 155 or approved equivalents.

For this major, HIST 130 may also be applied to General Education Breadth Area C1, C2, or C3, and POLS 155 may also be applied to General Education Breadth Area D1, D2, or D3.

Literacy Requirement:

See "Mathematics and Writing Requirements" in the University Catalog. Writing proficiency in the major is a graduation requirement and may be demonstrated through satisfactory completion of a course in your major which has been designated as the Writing Proficiency (WP) course for the semester in which you take the course. Students who earn below a C- are required to repeat the course and earn a C- or better to receive WP credit. See the Class Schedule for the designated WP courses for each semester. You must pass ENGL 130 (or its equivalent) with a C- or better before you may register for a WP course.

Course Requirements for the Major: 92 units

Completion of the following courses, or their approved transfer equivalents, are required of all candidates for this degree.

Enrollment in any mathematics course requires a grade of C- or higher in all prerequisite courses or their transfer equivalents.

Lower-Division Requirements: 33 units

9 courses required:

CSCI 111	Programming and Algorithms I	4.0	FS
Prerequisites: At least one year of high school algebra and strong computer skills or CSCI 101.			
CSCI 211	Programming and Algorithms II	4.0	FS
Prerequisites: CSCI 111 or EECE 135 with a grade of C- or higher.			
CSCI 221	Assembly Language Programming	3.0	FS
Prerequisites: CSCI 111 or EECE 135 with a grade of C- or higher.			
NSCI 102	Intro to Living Systems	3.0	FS *
MATH 120	Analytic Geometry and Calculus	4.0	FS *
Prerequisites: Completion of ELM requirement; both MATH 118 and MATH 119 (or high school equivalent); a score that meets department guidelines on a department administered calculus readiness exam.			
MATH 121	Analytic Geometry and Calculus	4.0	FS
Prerequisites: MATH 120.			
MATH 217	Discrete Math	3.0	FA
Prerequisites: Completion of ELM, MATH 119 (or equivalent), CSCI 111.			
PHYS 204A	Mechanics	4.0	FS *
Prerequisites: High school physics or faculty permission. Concurrent enrollment in or prior completion of MATH 121 (second semester of calculus) or equivalent.			
PHYS 204B	Electricity and Magnetism	4.0	FS
Prerequisites: MATH 121, PHYS 204A with a grade of C- or higher.			

Upper-Division Requirements: 59 units

15 courses required:

CINS 370	Introduction to Databases	3.0	SP
Prerequisites: CSCI 311 with a grade of C- or higher.			
CINS 448	Computer Security	3.0	FA
Prerequisites: Any upper-division computer networking course.			
CSCI 301	Computer's Impact on Society	3.0	FS * WP
Prerequisites: ENGL 130 (or its equivalent) with a grade of C- or higher; Junior standing.			
CSCI 311	Algorithms and Data Structures	4.0	FS
Prerequisites: CSCI 211 with a grade of C- or higher; MATH 217 recommended.			
EECE 320	System Architecture and Performance	3.0	FA
Prerequisites: CSCI 221 with a grade of C- or higher.			
CSCI 340	Operating Systems	4.0	SP
Prerequisites: CSCI 311 with a grade of C- or higher.			
CSCI 346	Intro to Computer Netwks/Mgmt	3.0	FA
Prerequisites: Grade of C- or higher in either CINS 220 or CSCI 221.			
CSCI 430	Software Engineering	3.0	FA
Prerequisites: ENGL 130 with a grade of C- or higher, CSCI 311 or EECE 337.			
CSCI 431	Software Engineering Tools	3.0	SP
Prerequisites: CSCI 430 with a grade of C- or higher.			
CSCI 465	Web Programming Fundamentals	3.0	FA
Prerequisites: CINS 370 with a grade of C- or higher.			
CSCI 490	Directed Programming Exp	3.0	FS
Prerequisites: CSCI 311 with a grade of C- or higher, Senior standing.			
CSCI 515	Compiler Design	3.0	SP
Prerequisites: CSCI 311 with a grade of C- or higher.			
CSCI 550	Theory of Computing	3.0	SP
Prerequisites: CSCI 311 with a grade of C- or higher; Math 217.			
CSCI 580	Artificial Intelligence	3.0	FA
Prerequisites: CSCI 311 with a grade of C- or higher.			
MATH 314	Prob & Stat for Science & Tech	4.0	SP
Prerequisites: MATH 121.			

1 course selected from:

CSCI 317	Linear Programming Apps	4.0	F2
Prerequisites: CSCI 311 with a grade of C- or higher.			
CSCI 351	Numerical Methods Programming	4.0	F1
Prerequisites: CSCI 311 with a grade of C- or higher.			

7 units selected from:

Select upper-division Computer Science (CSCI) or Computer Information Systems (CINS) courses, and/or upper-division Math courses that meet a requirement for the Minor in Mathematics. A maximum of 3 units may be taken for credit/no credit grading.

Additional Computer Science Graduation Requirement:

Graduating seniors must complete an exit exam as a requirement for graduation. Passing the exam is not required for the degree; the scores will be used for program assessment. Consult the department office for examination details.

Electives Requirement:

To complete the total units required for the bachelor's degree, select additional elective courses from the total University offerings. You should consult with an advisor regarding the selection of courses which will provide breadth to your University experience and possibly apply to a supportive second major or minor.

Grading Requirement:

All courses taken to fulfill major course requirements must be taken for a letter grade except those courses specified by the department as Credit/No Credit grading only.

A grade of C- or better is required in all computer science (CSCI) and Computer Information Systems (CINS) courses used for the major.

Advising Requirement:

Advising is mandatory for all majors in this degree program. Consult your undergraduate advisor for specific information.

Honors in the Major

Honors in the Major is a program of independent work in your major. It requires 6 units of honors course work completed over two semesters.

The Honors in the Major program allows you to work closely with a faculty mentor in your area of interest on an original performance or research project. This year-long collaboration allows you to work in your field at a professional level and culminates in a public presentation of your work. Students sometimes take their projects beyond the University for submission in professional journals, presentation at conferences, or academic competition. Such experience is valuable for graduate school and professional life. Your honors work will be recognized at your graduation, on

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your permanent transcripts, and on your diploma. It is often accompanied by letters of commendation from your mentor in the department or the department chair.

Some common features of Honors in the Major program are

1. You must take 6 units of Honors in the Major course work. All 6 units are honors classes (marked by a suffix of H), and at least 3 of these units are independent study (399H, 499H, 599H) as specified by your department. You must complete each class with a minimum grade of B.
2. You must have completed 9 units of upper-division course work or 21 overall units in your major before you can be admitted to Honors in the Major. Check the requirements for your major carefully, as there may be specific courses that must be included in these units.
3. Your *cumulative* GPA should be at least 3.5 or within the top 5% of majors in your department.
4. Your GPA in your major should be at least 3.5 or within the top 5% of majors in your department.
5. Most students apply for or are invited to participate in Honors in the Major during the second semester of their junior year. Then they complete the 6 units of course work over the two semesters of their senior year.
6. Your honors work culminates with a public presentation of your honors project.

While Honors in the Major is part of the Honors Program, each department administers its own program. Please contact your major department or major advisor to apply.

Honors in Computer Science

In addition to the common requirements for the Honors in the Major program given above, the Honors in Computer Science program includes the following:

1. You must be recommended by a faculty member.
2. Students who are admitted to the department's Honors in the Major program must complete 3 units of CINS 548H, CSCI 465H, CSCI 511H, CSCI 515H, CSCI 540H, CSCI 547H, CSCI 550H, CSCI 566H, CSCI 567H, CSCI 568H, CSCI 569H, CSCI 580H, or CSCI 583H, with a minimum grade of B. Unless other arrangements are made, the professor instructing the course you take becomes your faculty mentor. It is during this time that you must define a research problem or performance area and develop an Honors Research Project/Thesis proposal in preparation for work in CSCI 499H. You must also maintain a minimum GPA of 3.0 in your senior year. (Note: For the **BS in Computer Information Systems**, the Honors choices are CINS 548H, CINS 570H, CSCI 465H, CSCI 511H, CSCI 540H, or CSCI 547H.)
3. Each Honors in the Major class requires completion of the course plus an additional Honors project and culminates with a public presentation of your Honors project.

The Bachelor of Science in Computer Information Systems

Total Course Requirements for the Bachelor's Degree: 128 units

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A suggested Major Academic Plan (MAP) has been prepared to help students meet all graduation requirements within four years. Please request a plan from your major advisor or view it and other current advising information at <http://em.csuchico.edu/aap/ProgramSearch>.

General Education Requirements: 48 units

See "General Education Requirements" in the *University Catalog* and the *Class Schedule* for the most current information on General Education Requirements and course offerings. The course requirements marked below with an asterisk (*) may also be applied toward General Education.

HIST 130 may be used to fulfill any one of the Breadth Area C1, C2, or C3 requirements and POLS 155 may be used to fulfill any one of the Breadth Area D1, D2, or D3 requirements.

For additional University requirements, please see **Diversity and Literacy Requirements under the Bachelor of Science in Computer Science**.

U.S. History, Constitution, and American Ideals: 6 units

See "U.S. History, Constitution, and American Ideals" under "Bachelor's Degree Requirements". For this major, this requirement is normally fulfilled by completing HIST 130 and POLS 155 or approved equivalents.

Course Requirements for the Major: 86 units

Completion of the following courses, or their approved transfer equivalents, are required of all candidates for this degree.

Completion of these requirements also satisfies requirements for a minor in Business Administration.

Lower-Division Requirements: 24 units

7 courses required:

CINS 220	PCs and Peripherals	3.0	SP
CINS 242	Information Systems Design	3.0	FA
Prerequisites: CSCI 111 with a grade of C- or higher.			
CSCI 111	Programming and Algorithms I	4.0	FS
Prerequisites: At least one year of high school algebra and strong computer skills or CSCI 101.			
CSCI 211	Programming and Algorithms II	4.0	FS
Prerequisites: CSCI 111 or EECE 135 with a grade of C- or higher.			
MATH 105	Statistics	3.0	FS *
Prerequisites: Completion of ELM requirement.			
MATH 109	Survey of Calculus	4.0	FS *
Prerequisites: Completion of ELM requirement; MATH 118, MATH 119 (or High School equivalents).			
MATH 217	Discrete Math	3.0	FA
Prerequisites: Completion of ELM, MATH 119 (or equivalent), CSCI 111.			

Upper-Division Requirements: 38 units

8 courses required:

CINS 370	Introduction to Databases	3.0	SP
Prerequisites: CSCI 311 with a grade of C- or higher.			
CINS 448	Computer Security	3.0	FA
Prerequisites: Any upper-division computer networking course.			
CSCI 301	Computer's Impact on Society	3.0	FS * WP
Prerequisites: ENGL 130 (or its equivalent) with a grade of C- or higher; Junior standing.			
CSCI 311	Algorithms and Data Structures	4.0	FS
Prerequisites: CSCI 211 with a grade of C- or higher; MATH 217 recommended.			
CSCI 340	Operating Systems	4.0	SP
Prerequisites: CSCI 311 with a grade of C- or higher.			
CSCI 346	Intro to Computer Netwks/Mgmt	3.0	FA
Prerequisites: Grade of C- or higher in either CINS 220 or CSCI 221.			
CSCI 465	Web Programming Fundamentals	3.0	FA
Prerequisites: CINS 370 with a grade of C- or higher.			
CSCI 490	Directed Programming Exp	3.0	FS
Prerequisites: CSCI 311 with a grade of C- or higher, Senior standing.			

Database/ERP:

Note that prerequisites for the BSIS/MINS courses are waived for CINS students, but course content is unchanged.

1 course selected from:

BSIS 524	Business Programming with ABAP	3.0	Inq
Prerequisites: CSCI 111 or MINS 325.			
CINS 570	Advanced Database Mgmt Systems	3.0	FA
Prerequisites: CINS 370 with a grade of C- or higher or MINS 235.			
CINS 574	Adv Database Admin: Workshop I	3.0	S2
Prerequisites: CINS 370 with a grade of C- or higher.			
MINS 522	ERP: Systems Adm	3.0	FS
Prerequisites: Concurrent enrollment in or prior completion of MINS 345 and instructor permission.			

Networking/Security:

1 course selected from:

CINS 548	Advanced Computer Security	3.0	SP
Prerequisites: CINS 448 with a grade of C- or higher.			
CSCI 546	Adv Network Management	3.0	SP
Prerequisites: CSCI 346 with a grade of C- or higher.			
CSCI 547	Advanced Computer Networks	3.0	FA
Prerequisites: CSCI 346 with grade of C- or higher.			

Systems:

1 course selected from:

CSCI 344	Shell Programming	3.0	SP
Prerequisites: Grade of C- or higher in either CSCI 144 or CSCI 211.			
CSCI 444	Fundamental UNIX System Admin.	3.0	FA
Prerequisites: CSCI 344 with a grade of C- or higher.			
CSCI 540	Systems Programming	3.0	S2
Prerequisites: CSCI 340 with a grade of C- or higher.			

3 units selected from:

Select from upper-division Computer Science (CSCI) or Computer Information Systems (CINS) courses.

Formal Business Minor Requirements: 24 units

The following courses, or their approved transfer equivalents, also fulfill requirements for a Minor in Business Administration. Students are responsible for formally declaring the Minor in Business Administration.

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Computer Science

8 courses required:

ACCT	201	Intro to Financial Accounting	3.0	FS
ACCT	202	Intro to Managerial Accounting	3.0	FS
Prerequisites: ACCT 201 (or ABUS 261 for ABUS majors only).				
BLAW	302	Managing the Legal Environment	3.0	FS
Prerequisites: At least junior standing.				
ECON	103	Principles of Micro Analysis	3.0	FS *
FINA	307	Survey of Finance	3.0	FS
Prerequisites: ACCT 201, ECON 103.				
MGMT	303	Survey of Management	3.0	FS
MINS	301	Corporate Tech Integration	3.0	FS
MKTG	305	Survey of Marketing	3.0	FS

Electives Requirement:

To complete the total units required for the bachelor's degree, select additional elective courses from the total University offerings. You should consult with an advisor regarding the selection of courses which will provide breadth to your University experience and possibly apply to a supportive second major or minor.

Additional Computer Information Systems Graduation Requirement:

Graduating seniors must complete an exit exam as a requirement for graduation. Passing the exam is not required for the degree; the scores will be used for program assessment. Consult the department office for examination details.

Grading Requirement:

All courses taken to fulfill major course requirements must be taken for a letter grade except those courses specified by the department as Credit/No Credit grading only.

A grade of C- or better is required in all computer science (CSCI) or Computer Information Systems (CINS) courses used for the major.

Advising Requirement:

Advising is mandatory for all majors in this degree program. Consult your undergraduate advisor for specific information.

Honors in the Major

See Honors in the Major under the BS in Computer Science.

The Minor in Computer Science

Course Requirements for the Minor: 21 units

The following courses, or their approved transfer equivalents, are required of all candidates for this minor.

Lower-Division Requirements: 11 units

3 courses required:

CSCI	111	Programming and Algorithms I	4.0	FS
Prerequisites: At least one year of high school algebra and strong computer skills or CSCI 101.				
CSCI	211	Programming and Algorithms II	4.0	FS
Prerequisites: CSCI 111 or EECE 135 with a grade of C- or higher.				
MATH	217	Discrete Math	3.0	FA
Prerequisites: Completion of ELM, MATH 119 (or equivalent), CSCI 111.				

Upper-Division Requirements: 10 units

1 course required:

CSCI	311	Algorithms and Data Structures	4.0	FS
Prerequisites: CSCI 211 with a grade of C- or higher; MATH 217 recommended.				

6 units selected from:

Any upper-division Computer Science (CSCI) or Computer Information Systems (CINS) courses except CSCI 301, CSCI 313H, CSCI 380, and CSCI 381. 3 units may be from another department as long as the course has significant computational content, as determined by the Chair of the Department of Computer Science. Courses must be taken for a letter grade.

The Minor in Information Technology

Course Requirements for the Minor: 21 units

The following courses, or their approved transfer equivalents, are required of all candidates for this minor.

Lower-Division Requirements: 9 units

3 courses required:

CINS	110	Introductory Programming	3.0	FA
CINS	220	PCs and Peripherals	3.0	SP
CSCI	144	Introduction to UNIX/Linux	3.0	FA

Upper-Division Requirements: 12 units

3 courses required:

CINS	448	Computer Security	3.0	FA
Prerequisites: Any upper-division computer networking course.				
CSCI	344	Shell Programming	3.0	SP
Prerequisites: Grade of C- or higher in either CSCI 144 or CSCI 211.				
CSCI	346	Intro to Computer Netwks/Mgmt	3.0	FA
Prerequisites: Grade of C- or higher in either CINS 220 or CSCI 221.				

3 units selected from:

Upper-division Computer Science (CSCI) or Computer Information Systems (CINS) course (except CSCI 301, CSCI 313H, CSCI 380, CSCI 381), or upper-division course from another department as long as the course has significant computational content, as determined by the chair of the Department of Computer Science. Course must be taken for a letter grade.

The Master of Science in Computer Science

Course Requirements for the Master's Degree: 30 units

Continuous enrollment is required. A maximum of 9 semester units of transfer and/or CSU Chico Open University course work may be applied toward the degree.

Graduate Time Limit:

All requirements for the degree are to be completed within five years of the end of the semester of enrollment in the oldest course applied toward the degree. See "Graduate Education" in the University Catalog for complete details on general degree requirements.

Due to the rapid changes in the field of computer science, the Department of Computer Science requires all candidates to complete the program within five years, including projects and theses. No course validation will be allowed and no program extensions will be granted.

Prerequisites for Admission to Conditionally Classified Status:

1. Satisfactory grade point average as specified in "Admission to Master's Degree Programs" in the University Catalog.
2. Approval by the department and the Office of Graduate Studies.
3. An acceptable baccalaureate from an accredited institution, or an equivalent approved by the Office of Graduate Studies.
4. Completion of background preparation equivalent to
 - (a) CSCI 311 (Algorithms and Data Structures)
 - (b) EECE 320 (System Architecture and Performance)
 - (c) CSCI 340 (Operating Systems)
 - (d) MATH 217 (Discrete Mathematical Structures)
 - (e) MATH 120, MATH 121, MATH 314, or equivalents
5. Completion of the Graduate Record Examination with a combined score of 1100 on the verbal and quantitative portions. Graduates of an ABET accredited program in computer science are exempt from this requirement.
6. Submission of a statement of purpose.

Prerequisites for Admission to Classified Status:

In addition to any requirements listed above:

1. Completion of program prerequisites equivalent to the following senior courses:
 - (a) CSCI 430 (Software Engineering) with a grade of B- or better.
 - (b) CSCI 511 (Object-Oriented Programming) with a grade of B- or better.
2. Students are expected to complete these courses immediately as a matter of reasonable progress toward the master's degree.

Advancement to Candidacy:

In addition to any requirements listed above:

1. Completion of the Graduate Requirement in Writing Proficiency.
2. Classified graduate standing and completion of, or enrollment in, the graduate core courses.
3. Development of an approved program in consultation with the Graduate Coordinator.

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4. Formation of the graduate advisory committee, in the case of the thesis or project plan as described below, in consultation with the Graduate Coordinator.

Requirements for the MS Degree in Computer Science:

Completion of all requirements as established by the department graduate committee, the graduate advisory committee, and the Graduate School, to include:

1. Completion of an approved program consisting of 30 units of course work as follows:

(a) Completion of the 5 graduate core courses (15 units).

CSCI 611	Distributed Computing	3.0	SP
Prerequisites: CSCI 511 and classified graduate standing.			
CSCI 620	Computer Architecture	3.0	SP
Prerequisites: ECE 320 and classified graduate standing.			
CSCI 630	Software Engineering	3.0	FA
Prerequisites: CSCI 430 and classified graduate standing.			
CSCI 640	Operating Systems	3.0	SP
Prerequisites: CSCI 340 and classified graduate standing.			
CSCI 650	Design/Analysis of Algorithms	3.0	FA
Prerequisites: CSCI 311, MATH 217, and classified graduate standing.			

(b) Completion of 3 area courses (9 units), each course from a different area (Artificial Intelligence, Database, Networks/Security, or Visual Computing) listed below.

Artificial Intelligence

CSCI 580	Artificial Intelligence	3.0	FA
Prerequisites: CSCI 311 with a grade of C- or higher.			
CSCI 583	Expert Systems & Applications	3.0	SP
Prerequisites: CSCI 211 with a grade of C- or higher.			
CSCI 585	Robotics/Machine Intelligence	3.0	FA
Prerequisites: CSCI 211 with a grade of C- or higher; CSCI 221 with a grade of C- or higher.			
CSCI 682	Topics: Artificial Intel	3.0	Inq
Prerequisites: Classified graduate standing.			

Database

CINS 570	Advanced Database Mgmt Systems	3.0	FA
Prerequisites: CINS 370 with a grade of C- or higher or MINS 235.			
CINS 574	Adv Database Admin: Workshop I	3.0	S2
Prerequisites: CINS 370 with a grade of C- or higher.			
CINS 674	Adv Database Admin Workshop II	3.0	F2
Prerequisites: CINS 574 or faculty permission.			
CSCI 679	Topics in Database Systems	3.0	Inq
Prerequisites: Classified graduate standing.			

Networks/Security

CINS 548	Advanced Computer Security	3.0	SP
Prerequisites: CINS 448 with a grade of C- or higher.			
CSCI 546	Adv Network Management	3.0	SP
Prerequisites: CSCI 346 with a grade of C- or higher.			
CSCI 547	Advanced Computer Networks	3.0	FA
Prerequisites: CSCI 346 with grade of C- or higher.			
CSCI 649	Topics in Networking	3.0	Inq
Prerequisites: Classified graduate standing.			

Visual Computing

CSCI 566	Computer Graphics Programming	3.0	FA
Prerequisites: CSCI 311 with a grade of C- or higher.			
CSCI 567	Graphical User Interfaces	3.0	F2
Prerequisites: CSCI 311 with a grade of C- or higher.			
CSCI 568	Digital Image Processing	3.0	F1
Prerequisites: CSCI 311 with a grade of C- or higher.			
CSCI 569	Advanced Computer Graphics	3.0	SP
Prerequisites: CSCI 566 with a grade of C- or higher.			
CSCI 669	Topics in Computer Graphics	3.0	Inq
Prerequisites: Classified graduate standing.			

(c) Completion of 1 elective course (3 units), selected from any of the four areas in (b) above or the following additional elective options:

CSCI 533	Object-Oriented Analysis/Dsgn	3.0	S1
Prerequisites: Object-oriented programming experience.			
CSCI 540	Systems Programming	3.0	S2
Prerequisites: CSCI 340 with a grade of C- or higher.			
CSCI 598	Adv Topic in Computer Science	3.0	Inq
CSCI 619	Topics in Program Lang Theory	3.0	Inq
Prerequisites: Classified graduate standing.			
CSCI 629	Topics in Computer Architec	3.0	Inq
Prerequisites: Classified graduate standing.			
CSCI 639	Topics in Software Engineering	3.0	Inq
Prerequisites: Classified graduate standing.			
CSCI 659	Topics in Computer Theory	3.0	Inq
Prerequisites: Classified graduate standing.			

CSCI 697 Independent Study 1.0-6.0 FS
Prerequisites: Classified graduate standing, faculty permission.

(d) Completion of the appropriate culminating activity course (3 units) in one of the three plans described in section 2 below.

(e) At least 18 of the units required for the degree in 600-level courses.

(f) Not more than 9 semester units of transfer and/or CSU, Chico Open University course work (correspondence courses and UC extension course work are not acceptable). Transfer courses must be approved by the Graduate Coordinator.

2. Completion and final approval of one of the following three plans as approved by the Graduate Coordinator. The standard culminating experience for master's students in Computer Science is to demonstrate competency in graduate study by completion of the capstone course using plan (a). With rare exception, students may meet the requirement of a culminating experience by completing a thesis or project as described in the following:

(a) Capstone Course Plan

This plan includes 30 units of in-class course work, including a passing score in the capstone course CSCI 693. CSCI 693 is to be taken as part of the last 9 units, or during the last semester of the graduate program. Registration in CSCI 693 must be approved by the Graduate Coordinator. The course may be attempted a maximum of three times. Failure on the third attempt will result in dismissal from the graduate program in Computer Science.

(b) Project Plan

The project plan includes 27 units of in-class course work and 3 units of project preparation (CSCI 699P). For students to be qualified to take the project path, they must have demonstrated exceptional abilities by:

(i) maintaining a GPA of 3.5 or above in their post-baccalaureate course-work,

(ii) having been nominated by a faculty member to conduct research in that faculty member's area of expertise,

(iii) having had a project proposal approved by a 2/3 majority vote of the faculty. A formal written description of the project must be submitted to the Graduate School for approval and accession to the library.

(c) Thesis Plan

This plan includes 24-27 units of in-class course work and up to 6 units of thesis preparation (CSCI 699T). Students opting to complete 6 units of CSCI 699T may count 3 units of the units as their elective course in 1(c) above. For students to be qualified to take the thesis path, they must have demonstrated exceptional abilities by:

(i) maintaining a GPA of 3.5 or above in their post-baccalaureate course-work,

(ii) having been nominated by a faculty member to conduct research in that faculty member's area of expertise,

(iii) having had a thesis proposal approved by a 2/3 majority vote of the faculty. This plan requires a formal research thesis, which must be submitted to the Graduate School for approval and accession to the library.

3. Approval by the Graduate Coordinator and the Graduate Council on behalf of the faculty of the University.

Graduate Requirement in Writing Proficiency:

Writing proficiency is a graduation requirement.

Computer Science students will demonstrate their writing competence in the English language by successfully passing a Graduate Writing Exam (GWE) administered by the department at the beginning of each semester, or successful completion (B- higher) of an approved technical writing course. Students must either pass the GWE or immediately enroll in the writing course in their first semester of graduate study. Consult the Graduate Coordinator for specific information.

Graduate Grading Requirements:

All courses in the major (with the exceptions of Independent Study - 697, Master's Project - 699P, and Master's Thesis - 699T) must be taken for a letter grade, except those courses specified by the department as ABC/No Credit (400/500-level courses), AB/No Credit (600-level courses), or Credit/No Credit grading only. A maximum of 10 units combined of ABC/No Credit, AB/No Credit, and Credit/No Credit grades may be used on the approved program (including 697, 699P, 699T and courses outside the major). While grading standards are determined by individual programs and instructors, it is also the policy of the University that unsatisfactory grades may be given when work fails to reflect achievement of the high standards, including high writing standards, expected of students pursuing graduate study.

Students must maintain a minimum 3.0 grade point average in each of the following three categories: all course work taken at any accredited

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institution subsequent to admission to the master's program; all course work taken at CSU, Chico subsequent to admission to the program; and all courses on the approved master's degree program.

In addition, students may not count more than two courses in which they receive a grade of C toward the approved program.

The Faculty

- Judith A. Challinger, 1999, Assoc Professor, PhD, UC Santa Cruz.
- Abdel-Moaty M. Fayek, 1985, Chair, Assoc Professor, MS, CSU Chico.
- Leonard W. Fisk Jr, 1976, Professor, PhD, UC Irvine.
- Tyson R. Henry, 2001, Assoc Professor, PhD, U Arizona.
- Seung Bae Im, 1982, Professor, PhD, Southern Methodist U.
- Ben A. Juliano, 1998, Professor, PhD, Florida State U.
- Anne M. Keuneke, 1989, Professor, PhD, Ohio State U.
- Clement H. Luk, 1979, Professor, MS, SUNY Buffalo.
- Renee S. Renner, 1998, Professor, PhD, Florida State U.
- Melody J. Stapleton, 1981, Professor, PhD, UC Riverside.

Emeritus Faculty

- Robert L. Britton, 1969, Professor Emeritus, PhD, U Utah.
- Helen J. Gesick, 1983, Lecturer Emerita, MS, CSU Chico.
- Grace C. Hertlein, 1968, Professor Emerita, MA, CSU Chico.
- Ralph C. Hilzer, 1985, Professor Emeritus, MS, US Naval Postgrad School.
- Ralph C. Huntsinger, 1971, Professor Emeritus, PE, PhD, Montana State U.
- Orlando S. Madrigal, 1970, Professor Emeritus, PhD, Texas A&M U.
- James Murphy, 1980, Professor Emeritus, PhD, U Wisconsin.
- James R. Pinkert, 1977, Professor Emeritus, PhD, U Wisconsin.
- Wesley Gary Sitton, 1967, Professor Emeritus, PhD, U Alberta.
- Kent Wooldridge, 1982, Professor Emeritus, PhD, U Illinois.

Computer Information Systems Course Offerings

Please see the section on "Course Description Symbols and Terms" in the University Catalog for an explanation of course description terminology and symbols, the course numbering system, and course credit units. All courses are lecture and discussion and employ letter grading unless otherwise stated. Some prerequisites may be waived with faculty permission. Many syllabi are available on the Chico Web.

CINS 110 Introductory Programming 3.0 Fall

Programming for students not majoring in Computer Science or Engineering. This course introduces students to programming using an integrated graphical development environment. Event-driven, visual, and object-oriented programming concepts are presented. Projects include common business problems that require data entry, display of calculated results, report requests, conditional testing, arithmetic operations, array processing, data validation, searching, sorting, reading and writing to files, and database applications. 2.0 hours activity, 2.0 hours discussion. (002298)

CINS 220 PCs and Peripherals 3.0 Spring

This course focuses on the hardware and software of the modern PC, currently available peripherals and upgrades, and the basics of networking. Included will be a survey of the pros and cons of different hardware choices for various PCs, peripherals, and networking options. 2.0 hours activity, 2.0 hours discussion. (002337)

CINS 242 Information Systems Design 3.0 Fall

Prerequisites: CSCI 111 with a grade of C- or higher. Systems analysis and design, and the role of Information Systems in organizations. Emphasis is on the project-team design approach. Operational criteria, system feasibility, requirements, and cost trade-offs. Integration of personnel, equipment, hardware, and software. (002377)

CINS 370 Introduction to Databases 3.0 Spring

Prerequisites: CSCI 311 with a grade of C- or higher. This course provides an introduction to the theory and methodology for database design and implementation. Topics may include a survey/lecture component as well as a project component. The survey component covers entity-relationship modeling, relational algebra and calculus theories, data definition and data manipulation languages such as SQL, file structures, transactions, concurrency control, recovery, tuning and optimization, and object-oriented databases. The project entails requirements definition, design, and implementation of a database application. (002338)

CINS 448 Computer Security 3.0 Fall

Prerequisites: Any upper-division computer networking course. This course provides a broad overview of some of the more technical aspects of Information Systems Security. The content is designed to prepare students for the Certified Information Systems Security Professional/Associate (CISSP/A) examination from the International Information Systems Security Certification Consortium (ISP2), including a discussion of each of the following topics: security management practices; access control systems; telecommunications and network security; cryptography; security architecture and models; operations security; applications and systems development; business continuity planning and disaster recovery planning; law, investigation, and ethics; and physical security. (020232)

CINS 548 Advanced Computer Security 3.0 Spring

Prerequisites: CINS 448 with a grade of C- or higher. This course provides advanced training in the engineering and management of information systems security, particularly those systems that play a role in U.S. national security, and is aimed at professionals who plan to work either as contractors or federal employees in the area of national security or defense. The course also prepares students for the Information Systems Security Engineering Professional (ISSEP) certification test prepared by the International Information Systems Security Certification Consortium (ISP2) in collaboration with the National Security Agency. Specific areas of concentration are systems security engineering; certification and accreditation (C&A); technical management; and U.S. Government Information Assurance (IA) regulations. (020234)

CINS 570 Advanced Database Management Systems 3.0 Fall

Prerequisites: CINS 370 with a grade of C- or higher or MINS 235. Course topics include database application programming using a high performance, high concurrency multi-user database management system. This course covers the SQL programming language including Data Definition Language, Data Manipulation Language, and Data Control Language. The course then focuses on a procedural database programming language including control structures, composite datatypes, explicit cursors, exception handling, and writing embedded SQL applications. 2.0 hours activity, 2.0 hours discussion. (002381)

CINS 574 Advanced Database Architecture and Administration I 3.0 EvnSp

Prerequisites: CINS 370 with a grade of C- or higher. Students install the latest release of a robust, scalable database system such as Oracle, and create and maintain a sample database. Topics covered include advanced database architecture, intro performance monitoring, network configuration, database security, user management, and backup/recovery techniques with powerful admin tools. Prepares for Oracle Certification. (020614)

CINS 674 Database Administration II: Advanced Tuning and Recovery 3.0 EvnFa

Prerequisites: CINS 574 or faculty permission. Students install database software components and create and administer their own example databases. Features hands-on diagnosis and recovery in diverse, complex scenarios using advanced backup and recovery tools. Proactive performance analysis and tuning of applications, storage structures and database processes. Prepares for Adv. Oracle Certification. (002431)

Computer Science Course Offerings

CSCI 100 Computer Literacy 3.0 Fa/Spr

Introduction to the computer for non-computer science students. History of the computer, hardware, software, and a variety of computer applications are considered. The social impact and future of computers for communication systems are discussed. An integrated software package for word processing, spreadsheets, databases, and presentation is used. 2.0 hours activity, 2.0 hours lecture. Special fee required; see the Class Schedule. (002279)

CSCI 101 Introduction to Computer Science 3.0 Fa/Spr

Students who have had limited experience with computers should take CSCI 101 before CSCI 111. CSCI 101 provides an overview of the fundamentals of computer science. Number systems and data representation are introduced. An overview of hardware, including the control unit, memory, the ALU, and I/O is provided. Software is introduced with an overview of operating systems, programming languages, applications, and software tools. Students are exposed to common operating systems and applications. Student also design and implement several programs. 2.0 hours activity, 2.0 hours discussion. (002280)

CSCI 102	Living With Technology		3.0 Fa/Spr	<p>This course explores the impact of technology on our lives. Aspects of our complex technological society are investigated through study of the various forms technology takes, and readings in contemporary literature regarding the impact these technologies have on individuals. Students are encouraged to reflect on technology in their own lives through journaling, and to discourse with their peers on the benefits and harm to individuals, society, and humanity that modern technology presents. This is an approved General Education course. (020623)</p>
CSCI 111	Programming and Algorithms I		4.0 Fa/Spr	<p>Prerequisites: At least one year of high school algebra and strong computer skills or CSCI 101.</p> <p>A first-semester object-oriented programming course, providing an overview of computer systems and an introduction to problem solving, object-oriented software design, and programming. Coverage includes the software life cycle, as well as algorithms and their role in software design. Students are expected to design, implement, and test a number of programs. 2.0 hours activity, 3.0 hours lecture. (002281)</p>
CSCI 111X	Programming Problem Session		1.0 Fa/Spr	<p>Corequisites: CSCI 111.</p> <p>This course supplements CSCI 111 with additional programming activities. It provides students with the opportunity for additional assistance in developing programming abilities. 2.0 hours activity. Credit/no credit grading only. (020718)</p>
CSCI 144	Introduction to UNIX/Linux		3.0 Fall	<p>A comprehensive introduction to using the UNIX/Linux operating system and the Windows based Cygwin Linux emulator. The course includes hands-on experience with commands, files, and tools. Topics include basic UNIX/Linux commands, filename expansion, command history, command editing, using the UNIX file system (files, file protection, directories), I/O redirection, network utilities, text utilities (editors, office tools), managing processes, pipes, regular expressions, basic shell programming, and advanced utilities (sed, grep, awk). 2.0 hours activity, 2.0 hours discussion. (002302)</p>
CSCI 211	Programming and Algorithms II		4.0 Fa/Spr	<p>Prerequisites: CSCI 111 or EECE 135 with a grade of C- or higher.</p> <p>A second semester object-oriented programming course in computer science that emphasizes problem solving. This course continues the study of software specification, design, implementation, and debugging techniques while introducing abstract data types, fundamental data structures and associated algorithms. Coverage includes dynamic memory, file I/O, linked lists, stacks, queues, trees, recursion, and an introduction to the complexity of algorithms. Students are expected to design, implement, test, and analyze a number of programs. 2.0 hours activity, 3.0 hours lecture. (002282)</p>
CSCI 211X	Programming Problem Session		1.0 Fa/Spr	<p>Corequisites: CSCI 211</p> <p>This course supplements CSCI 211 with additional programming activities. It provides students with the opportunity for additional assistance in developing programming abilities. 2.0 hours activity. Credit/no credit grading only. (020719)</p>
CSCI 221	Assembly Language Programming		3.0 Fa/Spr	<p>Prerequisites: CSCI 111 or EECE 135 with a grade of C- or better.</p> <p>Topics include number systems and their rules for arithmetic; basic central processing unit (CPU) organization concepts such as registers, data paths, the arithmetic and logic unit (ALU) and the interface to random access memory (RAM); instruction formats, addressing modes and their uses with a variety of data structures; and parameter passing techniques including the use of a stack frame. The use of good programming methodologies to develop and document algorithms at the assembly language level is emphasized. 2.0 hours activity, 3.0 hours lecture. (002290)</p>
CSCI 221X	Programming Problem Session		1.0 Fa/Spr	<p>Corequisites: CSCI 221.</p> <p>This course supplements CSCI 221 with additional programming activities. It provides students with the opportunity for additional assistance in developing programming abilities. 2.0 hours activity. Credit/no credit grading only. (020720)</p>
CSCI 301	Computer's Impact on Society		3.0 Fa/Spr	<p>Prerequisites: ENGL 130 (or its equivalent) with a grade of C- or higher; Junior standing.</p> <p>Impact of computers and high-tech systems on people, institutions, organizations, and environment. Examines the following: law, medicine, education, government, data banks, privacy, computer security, changing work, automation, robots, expert systems, AI, social responsibility, ethics, war, conflict resolution. Includes weekly reading, midterm, and final writing projects. Weekly lectures, discussions, films, and writing. No programming. This is a writing proficiency, WP, course; a grade of C- or better certifies writing proficiency for majors. This is an approved General Education course. (002309)</p>
CSCI 311	Algorithms and Data Structures		4.0 Fa/Spr	<p>Prerequisites: CSCI 211 with a grade of C- or higher; MATH 217 recommended.</p> <p>This course focuses on object-oriented methodologies in designing and implementing a variety of data structures and algorithms. Coverage includes recursion, trees, search structures, hashing, heaps, sorting algorithms, and graph algorithms. Data structure and algorithm combinations will be studied and analyzed along with their relative merits using both mathematical and empirical measurements. The course includes a number of large programming assignments focusing on object-oriented software engineering and algorithm development. Students will be required to design, implement, test, and analyze their programs in at least one object-oriented language. 2.0 hours activity, 3.0 hours lecture. (002325)</p>
CSCI 311X	Programming Problem Session		1.0 Fa/Spr	<p>Corequisites: CSCI 311.</p> <p>This course supplements CSCI 311 with additional programming activities. It provides students with the opportunity for additional assistance in developing programming abilities. 2.0 hours activity. Credit/no credit grading only. (020721)</p>
CSCI 313H	Mind in the Machine - Honors		3.0 Spring	<p>Prerequisites: Acceptance into the Honors Program, faculty permission.</p> <p>An Honors seminar that explores the psychological, philosophical, social, biological, and technical aspects of machine "minds." Explores core issues within a subset of the disciplines that comprise the cognitive sciences, including artificial intelligence, philosophy, and psychology. Readings and discussions focus on theories of artificial intelligence and classic themes in human cognition and philosophy, such as determinism, consciousness, free-will, and the mind-body problem. The course focuses on increasing one's capability to express beliefs and evaluate arguments concerning various issues. This is an approved General Education course. This course is also offered as PSYC 332H. (002311)</p>
CSCI 315	Programming Languages		3.0 Fall	<p>Prerequisites: CSCI 211 with a grade of C- or higher.</p> <p>An investigation into the structure and syntax of current programming languages, including binding, scoping, data types, transfer-of-control structures, subprograms, abstract data types, object-oriented programming, and logical and functional programming. (002323)</p>
CSCI 317	Linear Programming Applications		4.0 EvnFa	<p>Prerequisites: CSCI 311 with a grade of C- or higher.</p> <p>Mathematical optimization and managerial decision techniques. Simplex method with applications, transportation problems, assignment problems, integer programming, network algorithms, and inventory models. 2.0 hours activity, 3.0 hours discussion. (002331)</p>
CSCI 320	Computer Architecture		3.0 Fall	<p>Prerequisites: CSCI 221 with a grade of C- or higher.</p> <p>The course introduces basic digital logic design techniques and integrates the topics of assembly language programming, computer organization, and computer design. Topics include the design of the arithmetic and logic unit (ALU), hardware multiplication and division, multiple clock cycle implementations, pipelined implementations, hazard detection and forwarding, design of a memory hierarchy, system busses and the design of a direct memory access (DMA) controller. (002336)</p>
CSCI 340	Operating Systems		4.0 Spring	<p>Prerequisites: CSCI 311 with a grade of C- or higher.</p> <p>Operating system fundamentals, including history, process and thread management, concurrency with semaphores and monitors, deadlocks, storage management, file systems, I/O, and distributed systems. 2.0 hours activity, 3.0 hours discussion. (002328)</p>

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CSCI 344 Shell Programming 3.0 Spring

Prerequisites: Grade of C- or higher in either CSCI 144 or CSCI 211. Shell programming provides an easy means to perform a wide range of text/data manipulation, system administration, network administration, and software development tasks in the UNIX, Linux, and Windows environments. This course provides an introduction to shell programming and the types of problems for which it is well suited. Topics include regular expressions, advanced UNIX/Linux utilities, the Bash scripting language, and the Perl programming language. Students solve a variety of tasks using UNIX/Linux utilities, Bash Script, and Perl. This course is recommended for students pursuing careers in software development, information technology, and information systems. 2.0 hours activity, 2.0 hours discussion. (002330)

CSCI 346 Introduction to Computer Networks and Network Management 3.0 Fall

Prerequisites: Grade of C- or higher in either CINS 220 or CSCI 221. This course is an introduction to basic networking technologies and network management concepts, including major network operating systems, communication protocols, and the supporting network hardware and software. The course emphasizes the hand-on experience of network management in a laboratory environment. 2.0 hours activity, 2.0 hours discussion. (002340)

CSCI 351 Numerical Methods Programming 4.0 OddFa

Prerequisites: CSCI 311 with a grade of C- or higher. Scientific programming methods, solution of simultaneous linear and non-linear equations, iterative techniques, matrix methods, error analysis, development of specific and general algorithms. 2.0 hours activity, 3.0 hours discussion. (002332)

CSCI 380 Machines, Brains, and Minds 3.0 Fa/Spr

Prerequisites: Junior standing, faculty permission. An examination of the emergence of artificial mind in machines, with special attention to related issues in the philosophy of mind and cognitive science. This is an approved General Education course. This course is also offered as PHIL 364. (002312)

CSCI 381 Language, Intelligence, and Computation 3.0 Spring

This course presents a practically based treatment of artificial intelligence, and a general introduction of technical issues associated with the development of intelligent systems. The course addresses issues of knowledge representation and natural language processing in particular, from a computational perspective. Students write programs to perform simple analyses of natural language and logical reasoning. Students also explore the limits of computation, using practical and theoretical approaches. 2.0 hours activity, 2.0 hours lecture. This is an approved General Education course. (002313)

CSCI 389 Industry Internship 1.0–3.0 Fa/Spr

Prerequisites: CSCI 311 with a grade of C- or higher, faculty permission. This internship is offered for 1.0-3.0 units. Students must register directly with a supervising faculty member. You may take this course more than once for a maximum of 15.0 units. Credit/no credit grading only. (002342)

CSCI 399 Special Problems 1.0–3.0 Fa/Spr

Prerequisites: Faculty permission. This course is a special topic offered for 1.0-3.0 units. You must register directly with a supervising faculty member. Independent study and investigation of special problems in student's area of concentration. Both registration and study plan must have approval of the instructor and the department chair. You may take this course more than once for a maximum of 6.0 units. Credit/no credit grading only. (002351)

CSCI 400 Computer Science Activity 1.0 Inquire

Prerequisites: Membership in a Computer Science student professional organization. Co-curricular activity associated with one or more student professional organizations. Examples include collegiate competitions, such as the ACM Programming Contest, and service projects. Substantial participation is required (approximately 30 hours minimum). 3.0 hours supervision. You may take this course more than once for a maximum of 3.0 units. Credit/no credit grading only. (020713)

CSCI 430 Software Engineering 3.0 Fall

Prerequisites: **CSCI 311 or EECE 337, ENGL 130 (or its equivalent) with a grade of C- or higher.** An overview of software engineering principles and practice. Topics include: traditional software engineering methodologies, agile software engineering methodologies, requirements engineering, software design, risk analysis, quality assurance, testing, group dynamics, communication, and project planning/management. Students work in groups to design and implement a semester long software project. 2.0 hours activity, 2.0 hours discussion. (002310)

CSCI 431 Software Engineering Tools 3.0 Spring

Prerequisites: CSCI 430 with a grade of C- or higher. An in depth look at software development tools and software engineering methodology. Topics include: agile software development, version control, static and dynamic code analysis, bug tracking, debugging, and build management. Students work in groups on a semester long project to understand and modify an existing large open source product. An agile software engineering methodology is used to manage the modification project. 2.0 hours activity, 2.0 hours discussion. (020615)

CSCI 444 Fundamental UNIX System Administration 3.0 Fall

Prerequisites: CSCI 344 with a grade of C- or higher. This course guides students through the fundamental responsibilities of UNIX system administration. Topics include file system monitoring, file and directory archiving, user account management, shutdown and rebooting sequences, system backups, system log responsibilities, and basic system security. Projects focus on the creation of shell scripts to automate system administration tasks. 2.0 hours activity, 2.0 hours discussion. (002372)

CSCI 465 Web Programming Fundamentals 3.0 Fall

Prerequisites: CINS 370 with a grade of C- or higher. This course is a comprehensive introduction to the major technologies used in the construction of interactive, client-server Web sites. Emphasis is placed on the protocols and standards used for exchanging data between the client and server programs. Both client and server side implementation methods are discussed using programming and scripting languages for the creation of dynamic Web pages. The use of direct client-to-server network communication, performance implications for implementation technologies, and techniques for increasing Web site security are discussed. (002368)

CSCI 490 Directed Programming Experience 3.0 Fa/Spr

Prerequisites: CSCI 311 with a grade of C- or higher, Senior standing. This capstone course provides a culminating activity in computer science. Students will work independently to specify, design, develop, test, and document a complete software application under faculty supervision. Students present status reports at weekly meetings, and present their finished project at the end of the semester. (002343)

CSCI 498 Topics in Computer Science 1.0–3.0 Inquire

This course is a special topic offered for 1.0-3.0 units. Exploration of selected topics in Computer Science. Consult semester schedules for specific listings. Standard letter grading only. (002389)

CSCI 499H Honors Research Project/Thesis 3.0 Fa/Spr

Prerequisites: Open only to juniors and seniors in the major. Open by invitation to computer science majors with a GPA of 3.5 or higher in the major. This Honors in the Major course focuses on the development of a creative research project in computer science, its presentation, discussion of relevant research materials, and the reporting of findings. 9.0 hours supervision. (002391)

CSCI 511 Object-Oriented Programming 3.0 Fall

Prerequisites: CSCI 311 with a grade of C- or higher. This class focuses on object-oriented programming using large class libraries and interactive programming environments. The course centers on good object-oriented design and implementation by addressing these issues with examples throughout the semester. Students will experience the development environment and extensively use the library of at least one object-oriented programming language. Topics include the proper use of inheritance and model/view/controller distinctions, various issues concerning multithreaded systems, I/O, exception handling, and distributed computing. (002356)

CSCI 515 Compiler Design 3.0 Spring

Prerequisites: CSCI 311 with a grade of C- or higher. The elements of lexical, syntactical, and semantic analysis including finite and push-down automata, top-down and bottom-up parsing, error detection and recovery, semantic actions and code generation. (002369)

CSCI 533 Object-Oriented Analysis & Design 3.0 OddSp

Prerequisites: Object-oriented programming experience. This class is complementary to classes in Object-Oriented Programming (OOP). The focus will be on object-orientation in the earlier phases of the software life cycle: object-oriented analysis (OOA), which creates models of the world based on objects and object-oriented design (OOD), which relates specifically to the design of software. The close relationship between OOA, OOD, and OOP will be examined. Use of the Unified Modeling Language (UML) and Design Patterns will be applied. (002355)

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CSCI 540	Systems Programming	3.0 EvnSp
Prerequisites: CSCI 340 with a grade of C- or higher. A hands-on project course that examines the development of systems software. It provides an introduction to writing low level programs in the UNIX/Linux environment. Topics include using system calls, processes, threads, concurrency, process/thread synchronization, signals, and inter-process communication. The course includes several large programming projects which provide students solid experience in lower level programming. (002378)		
CSCI 546	Advanced Network Management	3.0 Spring
Prerequisites: CSCI 346 with a grade of C- or higher. This course covers advanced network management concepts and implementations including a network operating system, workstation management, and domain administration. Coverage also includes TCP/IP administration and router/hub management. The course provides hands-on experience on network management in a laboratory environment. (002382)		
CSCI 547	Advanced Computer Networks	3.0 Fall
Prerequisites: CSCI 346 with grade of C- or higher. This course provides hands-on experience on network infrastructure management for hubs, switches, and routers in a laboratory environment. (002383)		
CSCI 550	Theory of Computing	3.0 Spring
Prerequisites: CSCI 311 with a grade of C- or higher; Math 217. An introduction to formal languages, grammars, and automata theory with unsolvable problems. (002371)		
CSCI 566	Computer Graphics Programming	3.0 Fall
Prerequisites: CSCI 311 with a grade of C- or higher. This course covers algorithms and data structures in computer graphics. Topics include output primitives and their attributes, 2-D and 3-D geometric transformations and viewing, 3-D object modeling, parallel and perspective projections, visible surface detection, illumination models, and rendering algorithms. (002363)		
CSCI 567	Graphical User Interfaces	3.0 EvnFa
Prerequisites: CSCI 311 with a grade of C- or higher. Implementation of graphical user interfaces using object-oriented programming. Topics include the model-view-controller design pattern, use of a variety of user interface components, event handling, customization, graphics contexts, and layout. (002365)		
CSCI 568	Digital Image Processing	3.0 OddFa
Prerequisites: CSCI 311 with a grade of C- or higher. Explores the field of digital image processing, providing an overview of its many areas of application and delving into the details of a select set of algorithms. Topics include imaging, digital images, basic image manipulation, grey level and color enhancement, neighborhood operations, the frequency domain, geometric operations, segmentation, morphological image processing, and image compression. (002407)		
CSCI 569	Advanced Computer Graphics	3.0 Spring
Prerequisites: CSCI 566 with a grade of C- or higher. Advanced topics in computer graphics, including hierarchical models and scene graphics, texture and bump mapping, compositing, antialiasing, representation and rendering of curves and surfaces, physically based models and particle systems, fractals, and techniques used in scientific visualization. (002406)		
CSCI 580	Artificial Intelligence	3.0 Fall
Prerequisites: CSCI 311 with a grade of C- or higher. An introduction to the basic principles, techniques, and applications of Artificial Intelligence. Coverage includes knowledge representation, logic, inference, problem solving, search algorithms, game theory, perception, learning, planning, and agent design. Students will program with AI language tools. Additional areas may include expert systems, machine learning, natural language processing, and computer vision. (002360)		
CSCI 583	Expert Systems and Applications	3.0 Spring
Prerequisites: CSCI 211 with a grade of C- or higher. The basic concepts and techniques of expert systems. Emphasis is on the reasoning behind expert system design, practical problem solving (comparisons and use of expert system shell implementations), and advanced problem solving techniques such as those employed in machine learning and knowledge acquisition. (002359)		
CSCI 585	Robotics and Machine Intelligence	3.0 Fall
Prerequisites: CSCI 211 and CSCI 221, both with a grade of C- or higher. This course introduces students to the field of robotics by emphasizing the task of endowing machines with intelligence. Topics include various case studies of robot architectures and algorithms that facilitate embodying a robot with behaviors that are traditionally associated with human cognition (e.g., perception, reasoning, intelligent navigation, vision, learning, etc.). Students conduct research and experiments with robotics hardware and software. 2.0 hours activity, 2.0 hours lecture. (002361)		
CSCI 598	Advanced Topics in Computer Science	3.0 Inquire
This course is a special topic offered for 1.0-3.0 units. Exploration of selected topics in Computer Science. Consult semester schedules for specific listings. Standard letter grading only. (020184)		
CSCI 611	Distributed Computing	3.0 Spring
Prerequisites: CSCI 511 and classified graduate standing. This course focuses on distributed computing using the object-oriented paradigm, large class libraries, and the interactive programming environment. The course is designed to prepare the student to do commercial enterprise development. Topics may include object serialization, beans, multithreading, networking, remote objects, database connectivity, servlets, and client/server programming with enterprise and application servers. (002395)		
CSCI 619	Topics in Programming Language Theory	3.0 Inquire
Prerequisites: Classified graduate standing. Further study of selected advanced topics in programming language theory as presented in recently published journals; possible emphasis on research interests and/or projects of faculty in the department. Consult the Graduate Coordinator to determine how many units may be counted toward your major. You may take this course more than once for a maximum of 12.0 units. (002392)		
CSCI 620	Computer Architecture	3.0 Spring
Prerequisites: EECE 320 and classified graduate standing. Provides a thorough and fundamental treatment of the art of computer architecture. Topics include concepts of von Neumann architectures, methods of evaluating CPU performance, instruction-set design and examples, compiler issues, instruction pipelining, superscalar processors, methods for reduction of branch penalty, memory hierarchies, I/O systems, floating-point arithmetic, and current issues in parallel processing. (002436)		
CSCI 629	Topics in Computer Architecture	3.0 Inquire
Prerequisites: Classified graduate standing. Further study of selected advanced topics in computer architecture as presented in recently published journals; possible emphasis on research interests and/or projects of faculty in the department. Consult the Graduate Coordinator to determine how many units may be counted toward your major. You may take this course more than once for a maximum of 12.0 units. (002423)		
CSCI 630	Software Engineering	3.0 Fall
Prerequisites: CSCI 430 and classified graduate standing. In-depth study and application of the planning, design, implementation, and management of complex software systems. Topics include requirements engineering, formal specifications, object-oriented analysis, design patterns, and peopleware. Teams of students will implement a large software project using a cutting edge software engineering approach. (002394)		
CSCI 639	Topics in Software Engineering	3.0 Inquire
Prerequisites: Classified graduate standing. Further study of selected advanced topics in software engineering as presented in recently published journals; possible emphasis on research interests and/or projects of faculty in the department. Consult the Graduate Coordinator to determine how many units may be counted toward your major. You may take this course more than once for a maximum of 12.0 units. (002396)		
CSCI 640	Operating Systems	3.0 Spring
Prerequisites: CSCI 340 and classified graduate standing. In-depth study of operating systems concepts including results from recent research. Topics may include processes, threads, virtual memory, file systems, distributed computing, scheduling, protection, and communication protocols. Students may be required to implement operating system projects. (002430)		

Highlighted text indicates a change from the original publication.

Computer Science

CSCI 649 Topics in Networking 3.0 Inquire

Prerequisites: Classified graduate standing.

Further study of selected advanced topics in networking as presented in recently published journals; possible emphasis on research interests and/or projects of faculty in the department. Consult the Graduate Coordinator to determine how many units may be counted toward your major. You may take this course more than once for a maximum of 12.0 units. (002413)

CSCI 650 Design and Analysis of Algorithms 3.0 Fall

Prerequisites: CSCI 311, MATH 217, and classified graduate standing.

Algorithms from many areas of computer science will be analyzed. Topics include algorithm design techniques (such as divide-and-conquer, greedy algorithms, dynamic programming, and others), mathematical and empirical analysis of algorithms and NP-completeness. (002417)

CSCI 659 Topics in Computer Theory 3.0 Inquire

Prerequisites: Classified graduate standing.

Further study of selected advanced topics in computer theory as presented in recently published journals; possible emphasis on research interests and/or projects of faculty in the department. Consult the Graduate Coordinator to determine how many units may be counted toward your major. You may take this course more than once for a maximum of 12.0 units. (002419)

CSCI 669 Topics in Computer Graphics 3.0 Inquire

Prerequisites: Classified graduate standing.

Further study of selected advanced topics in computer graphics as presented in recently published journals; possible emphasis on research interests and/or projects of faculty in the department. Consult the Graduate Coordinator to determine how many units may be counted toward your major. You may take this course more than once for a maximum of 12.0 units. (002408)

CSCI 679 Topics in Database Systems 3.0 Inquire

Prerequisites: Classified graduate standing.

Further study of selected advanced topics in database systems as presented in recently published journals; possible emphasis on research interests and/or projects of faculty in the department. Consult the Graduate Coordinator to determine how many units may be counted toward your major. You may take this course more than once for a maximum of 12.0 units. (002435)

CSCI 682 Topics in Artificial Intelligence 3.0 Inquire

Prerequisites: Classified graduate standing.

Further study of selected advanced topics in artificial intelligence as presented in recently published journals; possible emphasis on research interests and/or projects of faculty in the department. Consult the Graduate Coordinator to determine how many units may be counted toward your major. You may take this course more than once for a maximum of 12.0 units. (002402)

CSCI 693 Research methods in Computer Science 3.0 Fa/Spr

Prerequisites: Candidate status.

This course interweaves three distinct themes (investigation, experimentation, and technical writing), that culminate in a comprehensive research project, presentation, and oral defense. First, the students are immersed into the research process within Computer Science. This includes an understanding of the role, ethics, and responsibility of researchers in Computer Science. The second focus is on rigorous design of experiments for the purpose of testing research hypothesis, simulations, and models, and interpreting the results of those experiments. Finally, proficiency in communication of scientific ideas and findings will be addressed, from intensive reading, critiques, technical writing and oral presentations. (020616)

CSCI 697 Independent Study 1.0–6.0 Fa/Spr

Prerequisites: Classified graduate standing, faculty permission.

This course is an independent study offered for 1.0-6.0 units. You must register directly with a supervising faculty member. Independent study and investigation of special problems in student's area of concentration. Both registration and study plan must have approval of the instructor and the student's graduate advisory committee chair. You may take this course more than once for a maximum of 6.0 units. Credit/no credit grading only. (002451)

CSCI 698 Seminar in Advanced Topics 3.0 Inquire

This course is a seminar offered for 1.0-3.0 units. Typical subjects in past semesters have included microprogramming theory, operating system development, software engineering principles, data communications, analysis of algorithms, and program optimization. Consult the Class Schedule for listing and prerequisites. 2.0 hours activity, 2.0 hours discussion. (002446)

CSCI 699P Master's Project 3.0 Fa/Spr

Prerequisites: Candidate status.

You must register directly with a supervising faculty member. Independent study and investigation of special problems in student's area of concentration. Both registration and study plan must have approval of the instructor and the student's graduate advisory committee chair. Master's Project courses earn a Credit grade upon completion. (002461)

CSCI 699T Master's Thesis 1.0–6.0 Fa/Spr

Prerequisites: Candidate status.

This course is offered for 1.0-6.0 units. You must register directly with a supervising faculty member. Independent study and investigation of special problems in student's area of concentration. Both registration and study plan must have approval of the instructor and the student's graduate advisory committee chair. Master's Thesis courses earn a Credit grade upon completion. You may take this course more than once for a maximum of 6.0 units. (002453)