Program
BS in Computer Science
Options in:
   General
   Math/Science
   Systems
   Computer Graphics Programming
BS in Computer Information Systems
BS in Applied Computer Graphics
Options in:
   Production
   Technical
Minor in Computer Science
MS in Computer Science
The BS in Computer Science, BS in Computer Information Systems, and BS in Applied Computer Graphics, with their various options, allow students to prepare for careers in diverse areas of applications of Computer Science.

The MS in Computer Science provides a strong graduate-level foundation in Computer Science while also allowing exploration in areas of interest in the discipline.

The department offers students the opportunity to earn the distinction of Honors in Computer Science, Computer Information Systems, or Applied Computer Graphics. This recognition appears on the student’s permanent transcripts and on their diploma. The Honors confers a distinction that enhances opportunities for graduate work and employment.

Faculty and Facilities
The breadth of faculty expertise is evident from the many courses offered on varied topics: operating systems, programming languages, artificial intelligence, computer architecture, digital logic design, database management, computer graphics, compiler theory, software engineering, computer networks, and data communications.

The College of Engineering, Computer Science, and Technology is housed in the O’Connell Technology Center. Computing facilities available to computer science majors include five general-purpose labs containing Hewlett-Packard, Sun Microsystems, and Windows 2000 workstations. A seventh lab containing Hewlett-Packard workstations is available to members of Network for Women in Technology (NeWT). Additionally, the department has a separate computer networks laboratory, which allows students hands-on experiences in configuring and reconfiguring various types of networks, and the analysis of data obtained from network analyzers.

A variety of software tools are available, including a full complement of UNIX utilities, X-Windows tools, GNU software, Oracle relational database, Java development environment, API programming libraries and shells, and software packages or programming tools that support computer-aided software engineering, graphics and animation, etc.

O’Connell utilizes several high-speed local area networks and is connected to the rest of campus via an aggregated ethernet link. Computer science students have access to several high-speed modem pools for remote access.

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 Users’ Group (CSLUG) and Network for Women in Technology (NeWT) also provide opportunities for various student activities.

Cooperative Work Experience
The computer industry holds the Department in high regard in part because of 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 stop-out for a term and a summer (six to eight months) and work in the field and receive normal employee salary and academic credit for their valuable experience.

Career Outlook
The computer has enabled society to keep abreast of the increasing need for more and better information, opening up a wide range of computer-related jobs. Given the current expansion of science and technology, employment of trained computer scientists is expected to remain very high.

Accreditation
The BS in Computer Science is accredited by the Computer Science Accreditation Commission (CSAC) of the Computing Sciences Accreditation Board (CSAB).
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.

The department has prepared a suggested Four Year Advising Plan to help students meet all graduation requirements within four years. Please request a plan from your major adviser or view it and other current advising information on the CSU, Chico Web.

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.

Computer Science and Computer Information Systems

HIST 050 may be used to fulfill any one of the Breadth Area C1, C2, or C3 requirements and POLS 055 may be used to fulfill any one of the Breadth Area D1, D2, or D3 requirements.

For all Computer Science Options except Math Science: Of the three courses you must take to complete the 9-unit Upper-Division Thematic requirement, one must be science-oriented. That course must be approved in advance by your adviser in order to meet requirements of the Computing Sciences Accreditation Board.

For Math Science Option: Select an upper-division Humanities Thematic course and an upper-division Social Science Thematic course from the same Theme. See your adviser for assistance in identifying courses which apply. The upper-division Natural Science Thematic requirement is fulfilled by CSCI 165 or MATH 241A.

Cultural Diversity Course Requirements: 6 units

See “Cultural Diversity” in The University Catalog. Most courses used to satisfy these requirements may also apply to General Education.

American Institutions Requirement: 6 units

See the “American Institutions Requirement” under “Bachelor’s Degree Requirements.” For this major, this requirement is normally fulfilled by completing HIST 050 and POLS 055. For this major, HIST 050 may also be applied to General Education Breadth Area C1, C2, or C3, and POLS 055 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 with a grade of C- or better. That course must be approved in advance by your major adviser. See General Education requirements.

Cultural Diversity Course Requirements: 6 units

See “Cultural Diversity” in The University Catalog. Most courses used to satisfy these requirements may also apply to General Education.

American Institutions Requirement: 6 units

See the “American Institutions Requirement” under “Bachelor’s Degree Requirements.” For this major, this requirement is normally fulfilled by completing HIST 050 and POLS 055. For this major, HIST 050 may also be applied to General Education Breadth Area C1, C2, or C3, and POLS 055 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 with a grade of C- or better. That course must be approved in advance by your major adviser. See General Education requirements.

Course Requirements for the Major: 75-89 units

The following courses, or their approved transfer equivalents, are required of all candidates for this degree. Additional required courses, dependent upon a selected option or advising pattern, are outlined following the degree core program requirements.

DEGREE CORE PROGRAM: 56 units

Lower-Division Core: 25 units

7 courses required:

MATH 007A Analytic Geometry and Calculus 4.0 FS
Prerequisites: Completion of ELM requirement; both MATH 004 and MATH 006 (or high school equivalent); a score that meets department guidelines on a department administered calculus readiness exam.

MATH 007B Analytic Geometry and Calculus 4.0 FS
Prerequisites: Completion of ELM requirement; MATH 007A with a grade of C- or higher.

PHYS 004A Mechanics 4.0 FS
Prerequisites: High school physics or faculty permission. Concurrent enrollment in or prior completion of MATH 007B (second semester of calculus) or equivalent.

PHYS 004B Electricity and Magnetism 4.0 FS
Prerequisites: MATH 007B, PHYS 004A.

CSCI 015A Programming and Algorithms I 3.0 FS
Prerequisites: At least one year of high school algebra and strong computer skills or CSCI 014.

CSCI 015B Programming and Algorithm II 3.0 FS
Prerequisites: Grade of C- or better in CSCI 015A (or ECE 090 for engineering majors).

CSCI 051A Assembly Language Programming 3.0 FS
Prerequisites: CSCI 015B.

Upper-Division Core: 31 units

10 courses required:

CSCI 110 Computer’s Impact on Society 3.0 FS
Prerequisites: Junior standing.

CSCI 112 Software Engineering 3.0 FS
Prerequisites: CSCI 015B; ENGL 001 (or its equivalent) with a grade of C- or higher.

CSCI 150 Programming Languages 3.0 FS
Prerequisites: CSCI 015B.

CSCI 151 Algorithms and Data Structures 3.0 FS
Prerequisites: Grade of C- or better in CSCI 015B.

CSCI 152 Operating Systems Programming 3.0 FS
Prerequisites: CSCI 151 and CSCI 171.

CSCI 171 Computer Architecture 3.0 FS
Prerequisites: CSCI 015A.

CSCI 180 Project Requirements/Design/Test 3.0 FS
Prerequisites: ENGL 001; CSCI 015B or ECE 096.

NOTE: This course is the same as ECE 180 which may be substituted.

CSCI 190 Directed Programming Experience 1.0-3.0 FS
Prerequisites: CSCI 151.

Math Science Option Course Requirements: 19-33 units

The following courses, or their approved transfer equivalents, are required dependent upon the option chosen. Students must select one of the following options for completion of the major course requirements.

THE OPTION IN GENERAL COMPUTER SCIENCE: 19 units

1 course selected from:

CSCI 222 Expert Systems and Applications 3.0 SP
Prerequisites: CSCI 015B.

CSCI 223 Artificial Intelligence 3.0 FA
Prerequisites: Grade of C- or better in CSCI 151.

CSCI 231 Computer Graphics Programming 3.0 FA
Prerequisites: CSCI 151.

CSCI 233 Graphical User Interface Impl 3.0 SP
Prerequisites: CSCI 015B.

CSCI 273 Database Management 3.0 FS
Prerequisites: CSCI 015B.

CSCI 278 Computer Networks 3.0 FS
Prerequisites: CSCI 152.

Major Option Course Requirements: 19-33 units

The following courses, or their approved transfer equivalents, are required dependent upon the option chosen. Students must select one of the following options for completion of the major course requirements.

THE OPTION IN GENERAL COMPUTER SCIENCE: 19 units

1 course selected from:

One upper-division General Education Natural Science Thematic course approved in advance by your CSCI adviser. See General Education requirements.

2 courses required:

MATH 104 Prob & Stat for Science & Tech 4.0 FS
Prerequisites: MATH 007B.

CSCI 250 Compiler Design 3.0 FS
Prerequisites: CSCI 015B.

9 units selected from:

Any upper-division Computer Science (CSCI) courses (minimum of two courses at the 200-level) except CSCI 190 and CSCI 199.

THE OPTION IN MATH/SCIENCE: 33 units

6 courses required:

CHEM 037 General Chemistry 4.0 FS
Prerequisites: Second-year high school algebra; one year high school chemistry or CHMB 016. (One year of high school physics and one year of high school mathematics past Algebra II are recommended.)

MATH 007C Analytic Geometry and Calculus 4.0 FS
Prerequisites: Completion of ELM requirement; MATH 007B with a grade of C- or higher.

MATH 007D Elem Diff Equation/Vector Calc 4.0 FS
Prerequisites: Completion of ELM requirement; MATH 007C with a grade of C- or better.

MATH 105A Intro to Probability/Statistics 3.0 FA
Prerequisites: MATH 007B.

MATH 135 Elementary Linear Algebra 3.0 FS
Prerequisites: MATH 007B.
Physics 004C Heat/Wave Motion/Sound/Light 4.0 FS
Prerequisites: MATH 007B, PHYS 004A.

3 units selected from:

CSCI 165 Numerical Methods Programming 3.0 Inq
Prerequisites: CSCI 015B or ECE 090; MATH 007C.

MATH 241A Numerical Analysis 3.0 S2
Prerequisites: MATH 007C, MATH 133, completion of the computer literacy requirement.

MATH 241B Numerical Analysis 3.0 S1
Prerequisites: MATH 007D (may be taken concurrently), MATH 135, completion of the computer literacy requirement. MATH 241A is not a prerequisite for MATH 241B.

8 units selected from:

Any upper-division Computer Science (CSCI) course except CSCI 190 and CSCI 199.

THE OPTION IN SYSTEMS: 19 units

1 course selected from:

One upper-division General Education Natural Sciences Thematic course approved in advance by your CSCI adviser. See General Education requirements.

5 courses required:

CSCI 250 Compiler Design 3.0 FS
Prerequisites: CSCI 015B.

CSCI 270 Systems Design 3.0 FA
Prerequisites: CSCI 112.

CSCI 272 Multi-User Operating Systems 3.0 FA
Prerequisites: CSCI 152 or permission of instructor.

CSCI 280 Digital Logic Design Theory 3.0 SP
Prerequisites: CSCI 112.

MATH 104 Prob & Stat for Science & Tech 4.0 FS
Prerequisites: MATH 007B.

THE OPTION IN COMPUTER GRAPHICS PRO-GRAMMING: 24-25 units

1 course selected from:

One upper-division General Education Natural Sciences Thematic course approved in advance by your CSCI adviser. See General Education requirements.

5 courses required:

CSCI 040 Computer-Assisted Art I 3.0 FS *
Prerequisites: CSCI 040 or previous computer graphics experience.

CSCI 231 Computer Graphics Programming 3.0 FA
Prerequisites: CSCI 151.

CSCI 240 Computer Animation 3.0 FS
Prerequisites: CSCI 040 and CSCI 140 or permission of instructor.

MATH 104 Prob & Stat for Science & Tech 4.0 FS
Prerequisites: MATH 007B.

2 courses selected from:

CSCI 145 Web Page Design 3.0 FA
Prerequisites: CSCI 015A.

CSCI 232 Graphical User Interface Design 3.0 FA
Prerequisites: CSCI 151.

CSCI 233 Graphical User Interface Impl 3.0 SP
Prerequisites: CSCI 151.

CSCI 241 Advanced Animation Production 3.0 FS
Prerequisites: CSCI 040, CSCI 140, CSCI 240.

CSCI 245 Web Programming Fundamentals 3.0 SP
Prerequisites: CSCI 151.

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 adviser regarding the selection of courses which will provide breadth to your university experience and apply to a supportive second major or minor.

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.

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 courses required for the major.

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

Honors in the Major
Honors in the Major is a program of independent work in your major. It involves 6 units of honors course work completed over two semesters. Your Honors work will be recognized at your graduation, on 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. Most importantly, however, 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 competition in shows; such experience is valuable for graduate school and later professional life.

Some common features of Honors in the Major program are:
1. You must take 6 units of Honors in the Major course work. At least 3 of these 6 units are independent study (299H) 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 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 percent of majors in your department.
4. Your GPA in your major should be at least 3.5 or within the top 5 percent 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 adviser for further information.

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 CSCI 222H, CSCI 223H, CSCI 231H, CSCI 233H, CSCI 245H, CSCI 250H, CSCI 256H, CSCI 272H, CSCI 273H, CSCI 278H, or CSCI 280H 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 299H. You must also maintain a minimum GPA of 3.0 in your senior year.

(Warning: For the BS in Computer Information Systems, the Honors choices are CSCI 215H, CSCI 245H, CSCI 272H, CSCI 273H, CSCI 276H, CSCI 277H, or CSCI 280H. At the time of catalog publication, a proposed BS in Applied Computer Graphics is under review. Once that program is approved, the appropriate Honors courses will be CSCI 231H, CSCI 233H, CSCI 241H, or CSCI 245H.)

3. Each Honors in the Major class will require 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

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.

The department has prepared a suggested Four Year Advising Plan to help students meet all graduation requirements within four years. Please request a plan from your major adviser or view it and other current advising information on the CSU, Chico Web.

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.

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

American Institutions Requirement: 6 units

See the "American Institutions Requirement" under "Bachelor's Degree Requirements." For this major, this requirement is normally fulfilled by completing HIST 050 and POLS 055. For this major, HIST 050 may also be applied to General Education Breadth Area C1, C2, or C3, and POLS 055 may also be applied to General Education Breadth Area D1, D2, or D3.

Course Requirements for the Major: 79 units

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: 18 units

5 courses required:

MATH 005 Statistics 3.0 FS *
Prerequisites: Completion of ELM requirement.

MATH 009 Survey of Calculus 3.0 FS *
Prerequisites: Completion of ELM requirement. This course is not intended for majors in mathematics, physics, chemistry, or engineering.

CSCI 015A Programming and Algorithms I 3.0 FS
Prerequisites: At least one year of high school algebra and strong computer skills or CSCI 014.

CSCI 015B Programming and Algorithm II 3.0 FS
Prerequisites: Grade of C- or better in CSCI 015A (or ECE 090 for engineering majors).

CSCI 051A Assembly Language Programming 3.0 FS
Prerequisites: CSCI 015B.

1 course selected from:

CSCI 054 Intro to Applications Prog 3.0 FS
Prerequisites: CSCI 015A.

CSCI 057 Introduction to UNIX Operating 3.0 FS
Prerequisites: Concurrent enrollment in or prior completion of CSCI 015B.

Upper-Division Requirements: 37 units

7 courses required:

CSCI 112 Software Engineering 3.0 FS
Prerequisites: CSCI 015B; ENGL 001 (or its equivalent) with a grade of C- or higher.

CSCI 151 Algorithms and Data Structures 3.0 FS
Prerequisites: Grade of C- or better in CSCI 015B.

CSCI 152 Operating Systems Programming 3.0 FS
Prerequisites: CSCI 151 and CSCI 171.

CSCI 171 Computer Architecture 3.0 FS
Prerequisites: CSCI 015A.

CSCI 180 Project Requirements/Design/Test 3.0 FS
Prerequisites: ENGL 001, CSCI 015B or ECE 086.
This course is the same as ECE 180 which may be substituted.

CSCI 190 Directed Programming Experience 1.0-3.0 FS
Prerequisites: CSCI 151.

NOTE: One unit of CSCI 190 is required.

CSCI 273 Database Management 3.0 FS
Prerequisites: CSCI 013B.

6 courses selected from:

Choose courses from the Database/ERP, Networking, Systems, Web, or Computer Science listings below.

A minimum of one course must be from the Networking selections.
A minimum of one course must be from the Web selections.

NOTE that prerequisites for the MINS courses are waived for CIS students, but course content is unchanged.

Database/ERP:

BIS 220 ERP: Systems Config and Use 3.0 FS
Prerequisites: MINS 208, permission of instructor.

BIS 224 Business Programming with ABAP 3.0 FS
Prerequisites: CSCI 015A, permission of instructor; either BIS 220 or MINS 222.

CSCI 276 Advanced Database Mgmt Systems 3.0 FA
Prerequisites: CSCI 273 or MINS 118.

MINS 118 Database Application Development 3.0 FS
Prerequisites: BIS 110, MINS 018.

MINS 218 Database Administration 3.0 FS
Prerequisites: MINS 118 and instructor permission.

MINS 222 ERP: Systems Adm 3.0 FS
Prerequisites: Concurrent enrollment in or prior completion of MINS 214 and instructor permission.

Networking:

CSCI 178 Intro to Computer Networks & Mgmt 3.0 FS
Prerequisites: CSCI 015A.

CSCI 277 Adv Network Management 3.0 SP
Prerequisites: CSCI 152.

CSCI 278 Computer Networks 3.0 FS
Prerequisites: CSCI 152.

MINS 214 Distributed Systems Management 3.0 FS
Prerequisites: BIS 110, MINS 019.

MINS 215 Adv Distributed Systems Mgmt 3.0 FS
Prerequisites: MINS 214 and permission of instructor.

Systems:

CSCI 157 UNIX Power Utilities Shell Pgrm 3.0 FA

CSCI 257 Fundamental UNIX System Admin. 3.0 SP
Prerequisites: CSCI 157 or permission of instructor.

CSCI 270 Systems Design 3.0 FA
Prerequisites: CSCI 112.

CSCI 272 Multi-User Operating Systems 3.0 FA
Prerequisites: CSCI 152 or permission of instructor.

Web:

CDES 212 Advanced WWW Design & Publishing 3.0 FS
Prerequisites: CDES 112.

CDES 215 Human Interface Design 3.0 FA
Prerequisites: CDES 112.

CSCI 145 Web Page Design 3.0 FA
Prerequisites: CSCI 015A.

CSCI 215 Object-Oriented Programming 3.0 FA
Prerequisites: CSCI 151.

CSCI 245 Web Programming Fundamentals 3.0 SP
Prerequisites: CSCI 151.

MINS 219 E-Com & Client Server Computing 3.0 FS
Prerequisites: MINS 208; prior completion or concurrent enrollment in MINS 214.

Computer Science:

Any 200-level Computer Science course approved by adviser.

Business Minor Requirement: 24 units

The following courses, or their approved transfer equivalents, also fulfill requirements for a Minor in Business Administration.

8 courses required:

ACCT 015 Intro to Financial Accounting 3.0 FS
Prerequisites: ACCT 015 (or ABUS 083 for ABUS majors only).

BLAW 100 Managing the Legal Environment 3.0 FS
Prerequisites: At least junior standing.

ECON 003 Principles of Micro Analysis 3.0 FS *

FIN 150 Survey of Finance 3.0 FS
Prerequisites: ACCT 015, ECON 003.

MGMT 180 Managing People, Bus Proc, & Chg 3.0 FS
Prerequisites: MINS 110 Corporate Tech Integration 3.0 FS.

MKTG 170 Survey of Marketing 3.0 FS

For additional university requirements, please see Elective, Graduation, Grading, and Advising Requirements under the Bachelor of Science in Computer Science. Also see Honors in the Major, if applicable.
THE BACHELOR OF SCIENCE IN COMPUTER ENGINEERING

The Department of Electrical and Computer Engineering offers the BS in Computer Engineering. See the Engineering chapter.

THE BACHELOR OF SCIENCE IN APPLIED COMPUTER GRAPHICS

At the time of catalog publication, this proposed degree program is under review at the California State University Chancellor’s Office. Please contact the department to learn the current status of the program.

Total Course Requirements for the Bachelor’s Degree: 120 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.

The department has prepared a suggested Four Year Advising Plan to help students meet all graduation requirements within four years. Please request a plan from your major adviser or visit it and other current advising information on the CSU, Chico Web.

General Education Requirements: 48 units

See “General Education Requirements” in The University Catalog for specific course offerings. The course requirements marked below with an asterisk (*) may also be applied toward General Education.

Cultural Diversity Course Requirements: 6 units

See “Cultural Diversity” in The University Catalog. Most courses used to satisfy these requirements may also apply to General Education.

American Institutions Requirement: 6 units

See the “American Institutions Requirement” under “Bachelor’s Degree Requirements.” This requirement is normally fulfilled by completing HIST 050 and POLS 055. Courses used to satisfy this requirement do not apply to General Education.

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 001 (or its equivalent) with a C- or better before you may register for a WP course.

Course Requirements for the Major: 65-71 units

The following courses, or their approved transfer equivalents, are required of all candidates for this degree. Additional required courses, dependent upon a selected option or advising pattern, are outlined following the major core program requirements.

DEGREE CORE PROGRAM: 17 units

6 courses required:

CDES 023 Visual Communication Concepts 2.0 FS
CDES 092 Intro Photo Comm & Dig Imaging 3.0 FS
CSCI 015A Programming and Algorithms I 3.0 FS
Prerequisites: At least one year of high school algebra and strong computer skills or CSCI 014.
CSCI 040 Computer-Assisted Art I 3.0 FS *
CSCI 140 3-D Computer Modeling 3.0 SP
Prerequisites: CSCI 040 or previous computer graphics experience, CSCI 240. Computer Animation.
Prerequisites: CSCI 040 and CSCI 140 or permission of instructor.

Major Option Course Requirements: 22-27 units

The following courses, or their approved transfer equivalents, are required dependent upon the option chosen. Students must select one of the following options for completion of the major course requirements.

THE OPTION IN PRODUCTION: 22 units

4 courses required:

CSCI 189 Industry Internship 1.0-3.0 FS
Prerequisites: CSCI 151, faculty permission.
CSCI 189 must be taken for 3 units.
CSCI 199 Special Problems 1.0-3.0 FS
CSCI 199 must be taken once for 1 unit and a second time for 3 units.
The two courses cannot be taken during the same semester.
CSCI 241 Advanced Animation Production 3.0 FS
Prerequisites: CSCI 040, CSCI 140, CSCI 240.

1 course selected from:

AMST 165 American Folklore 3.0 FA
Prerequisites: ENGL 001 (or its equivalent) with a grade of C- or higher.
ART 240 American Art History 3.0 FS
Prerequisites: ART 029A and ART 001B for art majors, ENGL 001 (or its equivalent) with a grade of C- or higher.
ART 241 International Art: Contemporary 3.0 FS
Prerequisites: ART 029A and ART 001B for art majors, ENGL 001 (or its equivalent) with a grade of C- or higher.
ART 243 Medieval Art 3.0 FS
Prerequisites: ENGL 001 (or its equivalent) with a grade of C- or higher, ART 001A and ART 001B for art majors.
ART 245A North Renaissance/Mannerist Art 3.0 FS
Prerequisites: ENGL 001 (or its equivalent) with a grade of C- or higher, ART 001A and ART 001B for art majors.
ART 246 Baroque and Rococo Art 3.0 FS
Prerequisites: ENGL 001 (or its equivalent) with a grade of C- or higher, ART 001A and ART 001B for art majors.
ART 252 Greek Art 3.0 FS
Prerequisites: ENGL 001 (or its equivalent) with a grade of C- or higher, ART 001A and ART 001B for art majors.
ART 253 Roman Art 3.0 FS
Prerequisites: ENGL 001 (or its equivalent) with a grade of C- or higher, ART 001A and ART 001B for art majors.
ART 255 California Art 3.0 FS
Prerequisites: ENGL 001 (or its equivalent) with a grade of C- or higher, ART 001A and ART 001B for art majors.
ARTHEA 151 Musical Theatre I 3.0 FS
Prerequisites: ENGL 001 (or its equivalent) with a grade of C- or higher, ART 001A and ART 001B for art majors.
ARTHEA 264 Development of Drama 3.0 SP
Prerequisites: ENGL 001 (or its equivalent) with a grade of C- or higher.

Applied Computer Graphics Electives

3 courses selected from:

CDES 066 Introduction to Audio in Media 3.0 FS
CDES 122 Computer Graphics 3.0 FS
CDES 132 Graphic Visualization 3.0 FS
Prerequisites: CDES 029V for CDES majors. Other majors require instructor permission.
CDES 168A Field Video Production 3.0 FS
Prerequisites: CDES 003, CDES 066, CDES 092; CDES 040, CDES 065 (both with a grade of C or better).
CDES 168B Studio Video Production 3.0 FS
Prerequisites: CDES 168A.
CDES 212 Advanced WWW Design & Publishing 3.0 FS
Prerequisites: CDES 112.
CDES 215 Human Interface Design 3.0 FA
Prerequisites: CDES 112.
CDES 243 Video Production Workshop 3.0 FA
Prerequisites: CDES 168A.
CDES 270A Intro Multimedia Dsgn & Develop 3.0 FA
Prerequisites: Basic computer literacy, faculty permission.
CDES 270B Adv Multimedia Dsgn & Develop 3.0 SP
Prerequisites: CDES 270A.
CSCI 145 Web Page Design 3.0 FA
Prerequisites: CSCI 015A.
PHED 218 3-D Desktop Video Applications 3.0 FS
Prerequisites: PHED 185 and basic computer literacy.
PHED 226 Interactive Multimedia 3.0 FS
THEA 060 Acting 3.0 FS *
THE OPTION IN TECHNICAL: 27 units

7 courses required:
CSCI 0158 Programming and Algorithm II 3.0 FS
Prerequisites: Grade of C- or better in CSCI 015A (or ECE 090 for engineering majors).
CSCI 051A Assembly Language Programming 3.0 FS
Prerequisites: CSCI 015B.
CSCI 112 Software Engineering 3.0 FS
Prerequisites: CSCI 015B; ENGL 001 (or its equivalent) with a grade of C- or higher.
CSCI 151 Algorithms and Data Structures 3.0 FS
Prerequisites: Grade of C- or better in CSCI 015B.
CSCI 171 Computer Architecture 3.0 FS
Prerequisites: CSCI 051A.
CSCI 231 Computer Graphics Programming 3.0 FA
Prerequisites: CSCI 151.
MATH 009 Survey of Calculus 3.0 FS *
Prerequisites: Completion of ELM requirement. This course is not intended for majors in mathematics, physics, chemistry, or engineering.

Applied Computer Graphics Electives
2 courses selected from:
CDES 066 Introduction to Audio in Media 3.0 FS
Prerequisites: CDES 002, CDES 065, CDES 092; CDES 040, CDES 066 (both with a grade of C or better).
CDES 168B Studio Video Production 3.0 FS
Prerequisites: CDES 168A.
CDES 212 Advanced WWW Design & Publishing 3.0 FS
Prerequisites: CDES 112.
CDES 215 Human Interface Design 3.0 FA
Prerequisites: CDES 112.
CDES 243 Video Production Workshop 3.0 FA
Prerequisites: CDES 168A.
CDES 270A Intro Multimedia Dsgn & Develop 3.0 FS
Prerequisites: Basic computer literacy, faculty permission.
CDES 270B Adv Multimedia Dsgn & Develop 3.0 SP
Prerequisites: CDES 270A.
CSCI 145 Web Page Design 3.0 FA
Prerequisites: CSCI 015A.
CSCI 232 Graphical User Interface Design 3.0 FA
Prerequisites: CSCI 151.
CSCI 233 Graphical User Interface Impl 3.0 SP
Prerequisites: CSCI 151.
CSCI 241 Advanced Animation Production 3.0 FS
Prerequisites: CSCI 040, CSCI 140, CSCI 240.
CSCI 245 Web Programming Fundamentals 3.0 SP
Prerequisites: CSCI 151.
PHED 218 3-D Desktop Video Applications 3.0 FS
PHED 224 Biomechanical Analysis 3.0 FS
Prerequisites: PHED 185 and basic computer literacy.
PHED 226 Interactive Multimedia 3.0 FS
TEA 080 Acting 3.0 FS *
TEA 160 Intermediate Acting I 3.0 FS
Prerequisites: TEA 060 required; TEA 090 and TEA 095 recommended.
TEA 170 Stage Lighting 3.0 SP
Prerequisites: TEA 017, TEA 076. Concurrent enrollment in TEA 173 is recommended.

Communication Design Program: 26-27 units

The following courses or their approved transfer equivalents also fulfill requirements for a Minor in Communication Design offered by the Department of Communication Design.

3 courses required:
CDES 001 Introduction to Communication 3.0 FS
This course is the same as JOUR 001 which may be substituted.
CDES 002 Principles of Comm Design 3.0 FS
CDES 107 Technology and Communication 3.0 FS
Prerequisites: CDES 002.

3 courses selected from:
CDES 003 Writing for Electronic Media 3.0 FS
Prerequisites: ENGL 001.
CDES 040 Media Aesthetics 3.0 FS
CDES 065 Foundations of Electronic Media 3.0 FS
Prerequisites: CDES 065 (both with a grade of C or better); faculty permission.
CDES 080 Survey of Print Publishing 2.0 FS
Prerequisites: CDES 003, CDES 066.
CDES 131 History of Life & Design 3.0 SP
CDES 140 Film: Its Origins and Meanings 3.0 SP
CDES 147 Documentary Film 3.0 FA
CDES 160 Broadcast News 3.0 FS
Prerequisites: CDES 003, CDES 066.
CDES 162 Media Performance 3.0 FA
Prerequisites: CDES 003, CDES 066.
CDES 163 Public Affairs Programming 3.0 FA
Prerequisites: CDES 003, CDES 066, CDES 065 (with a grade of C or better).
CDES 240 Cur Trnds in Info & Comm Indust 3.0 FS
Prerequisites: CDES 003, CDES 066, CDES 092; CDES 040, CDES 065 (both with a grade of C or better).
CDES 268 American Radio and Television 3.0 SP
Prerequisites: Junior standing, CDES 003, CDES 066, CDES 092; CDES 040, CDES 065 (both with a grade of C or better); faculty permission.

3 courses selected from:
Select three additional courses from Applied Computer Graphics Electives in your chosen option.

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 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 courses required for the major.

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

SUPPLEMENTAL PROGRAM REQUIREMENTS: 26-27 units

Select one of the following supplemental programs, Art Studio or Communication Design, either of which will also fulfill all requirements for the degree minor indicated.

Art Studio Program: 27 units

The following courses or their approved transfer equivalents also fulfill requirements for the Minor in Art Studio offered by the Department of Art and Art History.

5 courses required:
ART 001A Art History Survey 3.0 FS *
ART 001B Art History Survey 3.0 FS *
ART 003A Basic Drawing 3.0 FS
ART 003B Basic Drawing 3.0 FS
Prerequisites: ART 003A or faculty permission.
ART 081 Intro to Fine Art Photography 3.0 FS

1 course selected from:
ART 015A Color Theory 3.0 FS
ART 015B Design 3.0 FS

1 course selected from:
ART 006 Beginning Ceramics 3.0 FS
ART 033 Beginning Painting 3.0 FS
ART 035 Introduction to Sculpture 3.0 FS
ART 036 Beginning Fiber 3.0 FS
ART 038 Printmaking 3.0 FS

2 courses selected from:
ART 109 Intermediate Life Drawing 3.0 FS
Prerequisites: ART 003A; ART 003B; or faculty permission.
ART 135A Interned Sculpture: Mixed Media 3.0 FS
Prerequisites: ART 035 for art majors (sculpture emphasis) or ART 015B for art majors (non-sculpture); faculty permission for non-majors.
ART 158 Intermediate Electronic Arts 3.0 FS
Prerequisites: ART 003B, ART 015B, ART 058; or faculty permission.
ART 191 Interned Fine Art Photography 3.0 FS
Prerequisites: Introductory photography course on the college level, or faculty permission.
ART 209 Advanced Life Drawing 3.0 FS
Prerequisites: ART 109 or faculty permission.
ART 109 Intermediate Life Drawing 3.0 FS
Prerequisites: ART 033A, ART 003B, or faculty permission.
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: 9 units

3 courses required:
- CSCI 015A Programming and Algorithms I (3.0 FS)
  Prerequisites: At least one year of high school algebra and strong computer skills or CSCI 014.
- CSCI 015B Programming and Algorithms II (3.0 FS)
  Prerequisites: Grade of C- or better in CSCI 015A (or ECE 090 for engineering majors).
- CSCI 051A Assembly Language Programming (3.0 FS)
  Prerequisites: CSCI 015B.

Upper-Division: 12 units

2 courses required:
- CSCI 151 Algorithms and Data Structures (3.0 FS)
  Prerequisites: Grade of C- or better in CSCI 015B.
- CSCI 171 Computer Architecture (3.0 FS)
  Prerequisites: CSCI 051A.

6 units selected from:
Any upper-division Computer Science (CSCI) courses except CSCI 189, CSCI 190, and CSCI 199.

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 computer science or 6 semester units of computer science related transfer credit may be applied toward the degree.

Graduate Time Limit: All requirements for the degree are to be completed within seven 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.

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 Programs.
3. An acceptable baccalaureate from an accredited institution, or an equivalent approved by the Office of Graduate Programs.
4. Completion of background preparation equivalent to:
   - (a) CSCI 151 (Algorithms and Data Structures)
   - (b) CSCI 171 (Computer Architecture)
   - (c) MATH 007A, MATH 007B, MATH 104, MATH 120 or equivalents.

Prerequisites for Admission to Classified Status:

In addition to any requirements listed above:
1. Completion of background preparation equivalent to the following undergraduate courses:
   - (a) CSCI 112 (Software Engineering)
   - (b) CSCI 152 (Operating Systems Programming)

All required undergraduate Computer Science courses must be taken for a letter grade, and a grade of C- or better must be earned in each course. 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. Classified graduate standing and completion of, or enrollment in, the graduate core courses.
2. Development of an approved program in consultation with the Graduate Coordinator.
3. If the thesis or project option is chosen, formation of the graduate advisory committee 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 Office of Graduate Programs, to include:
1. Completion of an approved program consisting of 30 units of 200/300-level courses as follows:
   - (a) At least 24 units in the discipline of Computer Science.
   - (b) completion of the graduate core courses:
     - CSCI 312 Software Engineering (3.0 FA)
     - CSCI 356 Design & Analysis of Algorithms (3.0 FA)
     - CSCI 372 Operating Systems (3.0 SP)
     - CSCI 380 Computer Architecture (3.0 SP)
   - (c) At least 18 of the units required for the degree in 300-level courses.
   - (d) Not more than 9 semester units of transfer and/or extension credit (correspondence courses and U.C. extension course work are not acceptable).
2. Completion and final approval of one of the following three plans as approved by the Graduate Coordinator:
   - (a) Examination Plan. This plan includes 30 units of in-class course work, and a passing score on the written comprehensive examination covering the core. The examination may be taken a maximum of two times. Failure on the second 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 399). The project must reflect a personal in-depth study of a topic in an applied area of computer science. A formal written description of the project must be submitted to the Office of Graduate Programs for approval and access to the library.
   - (c) Thesis Plan. This plan includes 24 units of in-class course work and 6 units of thesis research and preparation (CSCI 399). Research may be theoretical or applied, but must reflect a personal in-depth study into an approved topic. This plan requires a formal research thesis which must be submitted to the Office of Graduate Programs for approval and access to the library.
3. Approval by the Graduate Coordinator and the Graduate Coordinators Committee on behalf of the faculty of the university.

Graduate Literacy Requirement:

Writing proficiency is a graduation requirement.

Computer Science students will demonstrate their writing competence through successfully completing a departmentally administered examination given at the beginning of each semester or successful completion (B or better) of an approved technical writing course. The writing examination may be taken a maximum of two times. Consult the Graduate Coordinator for specific information.

Graduate Grading Requirements:

All courses in the major (with the exceptions of Independent Study-398 and Master's Study-399) must be taken for a letter grade, except those courses specified by the department as ABC/No Credit (200-level courses), AB/No Credit (300-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 398, 399, 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 3.0 grade point average in all course work on the approved master's degree program as well as in all course work taken subsequent to admission to conditionally classified status.

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

### CSCI 010 Computer Literacy
3.0 Fa/Spr
Introduction to the computer for non-computer science students. History of the computer, review of hardware, software, and a range of computer applications are covered. 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 lecture, 2.0 hours activity. Special fee required; see The Class Schedule. CAN CSCI 2.

### CSCI 014 Introduction to Computer Science
3.0 Fa/Spr
Students who have had limited experience with computers should take CSCI 014 before CSCI 015A. CSCI 014 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, 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. Students also design and implement several programs. 2.0 hours discussion, 2.0 hours activity.

### CSCI 015A Programming and Algorithms I
3.0 Fa/Spr
Prerequisites: At least one year of high school algebra and strong computer skills or CSCI 014.
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 discussion, 2.0 hours activity. CAN CSCI 22.

### CSCI 015B Programming and Algorithms II
3.0 Fa/Spr
Prerequisites: Grade of C- or better in CSCI 015A (or ECE 090 for engineering majors).
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 will be expected to design, implement, test, and analyze a number of programs. 2.0 hours discussion, 2.0 hours activity. CAN CSCI 24.
CSCI 116H Mind in the Machine-Honors 3.0 Spring
Prerequisites: Acceptance to the Honors Program; faculty permission.
This Honors seminar explores the psychological, philosophical, social, biological, and technical aspects of human “mind.” 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 the same as PSY 116H which may be substituted.

CSCI 122 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 the same as PHIL 132 which may be substituted.

CSCI 123 Language, Intelligence, and Computation 3.0 Fa/Spr
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 lecture, 2.0 hours activity. This is an approved General Education course.

CSCI 140 3-D Computer Modeling 3.0 Spring
Prerequisites: CSCI 040 or previous computer graphics experience.
This course uses 3-D modeling and animation software in developing 3-D computer models and creating presentations of those models in storytelling still scenes. The tools, techniques, and topics studied will include basic and advanced 3-D modeling tools, 3-D scene layout, lighting, texturing, and rendering. 1.0 hour discussion, 4.0 hours activity.

CSCI 145 Web Page Design 3.0 Fall
Prerequisites: CSCI 015B.
This course focuses on the study of design and implementation issues for Web page creation and maintenance from the perspective of programming and writing code. Topics include page purpose, content, audience, navigation, speed, style, and maintenance issues, mark-up language tags, style sheets, dynamic mark-up language, scripting. Students are required to work collaboratively to produce functional sites and make verbal presentations. 2.0 hours lecture, 2.0 hours activity.

CSCI 150 Programming Languages 3.0 Fa/Spr
Prerequisites: CSCI 015B.
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 functional programming.

CSCI 151 Algorithms and Data Structures 3.0 Fa/Spr
Prerequisites: Grade of C- or better in CSCI 015B.
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 discussion, 2.0 hours activity.

CSCI 152 Operating Systems Programming 3.0 Fa/Spr
Prerequisites: CSCI 151.
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 discussion, 2.0 hours activity.

CSCI 157 UNIX Power Utilities and Shell Programming 3.0 Fall
This is an intermediate level UNIX class. During the first part of the course, UNIX users will learn to use (or brush up on) their facility with power utilities such as sed, grep, awk, find, cut, paste, and join as preparation for creating shell scripts. Shell programming in the latter part of the course will focus primarily on the Bourne shell; however, some of the special features of C-shell and Korn shell scripts will be covered. 2.0 hours discussion, 2.0 hours activity.

CSCI 160 Linear Programming Applications 3.0 Inquire
Prerequisites: CSCI 015B.
Mathematical optimization and managerial decision techniques. Simplex method with applications, transportation problems, assignment problems, integer programming, network algorithms, and inventory models. 2.0 hours discussion, 2.0 hours activity.

CSCI 165 Numerical Methods Programming 3.0 Inquire
Prerequisites: CSCI 015B or ECE 090; MATH 007C.
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 discussion, 2.0 hours activity.

CSCI 171 Computer Architecture 3.0 Fa/Spr
Prerequisites: CSCI 015A.
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 implementation, pipelined implementations, hazard detection and forwarding, design of a memory hierarchy, system busses and the design of a direct memory access (DMA) controller, cache consistency in multiprocessor systems, and implementation of a snooping cache.

CSCI 172 Systems Architecture 3.0 Inquire
Prerequisites: ENGL 001 (or its equivalent) with a grade of C- or higher, CSCI 151, CSCI 171. Concurrent enrollment in CSCI 152 is recommended.
Definition of problems relating to interfacing processors and peripherals in computer systems. Channel and bus structures, bandwidth computations, performance evaluation, feasibility studies, and methods of systems analysis. This is a writing proficiency, WP, course; a grade of C- or better certifies writing proficiency for majors.

CSCI 178 Introduction to Computer Networks and Network Management 3.0 Fa/Spr
Prerequisites: CSCI 015A.
This course is an introduction to basic knowledge of networking technologies and network management concepts, including major network operating systems, communication protocols, and the supporting network hardware and software. The course emphasizes the hands-on experience of network management in a laboratory environment. 2.0 hours discussion, 2.0 hours activity.

CSCI 180 Project Requirements, Design, and Testing 3.0 Fa/Spr
Prerequisites: ENGL 001; CSCI 015B or ECE 086.
Students are introduced to methodologies used to specify system descriptions. Hardware and software documentation standards are described. Methodologies for modeling systems and development of presentation materials are discussed, and students are required to make both written and oral presentations. 2.0 hours discussion, 2.0 hours activity. This course is the same as ECE 180 which may be substituted.

CSCI 189 Industry Internship 1.0-3.0 Fa/Spr
Prerequisites: CSCI 151, faculty permission.
This internship is offered as 189A-C for 1.0-3.0 units respectively. Students must register directly with a supervising faculty member. Credit/no credit grading only.

CSCI 190 Directed Programming Experience 1.0-3.0 Fa/Spr
Prerequisites: ENGL 001; CSCI 015B or ECE 086.
This course is special topic programming experience offered as 190A-C, for 1.0-3.0 units respectively. You must register directly with a supervising faculty member. Directed experience in programming systems and applications, weekly conferences, limited to a maximum of 4 units during degree program. Projects may consist of from one to 10 students working on software development teams. Credit/no credit grading only.

CSCI 211 Object-Oriented Analysis & Design 3.0 Spring
Prerequisites: CSCI 151.
This course 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 (OOD), which creates models of the world based on object and object-oriented design (OOD), which relates specifically to the design of software. The course is designated as OOD, and OOP will be examined. Use of the Unified Modeling Language (UML) and Design Patterns will be applied. Formerly CSCI 311.
techniques for increasing Web site security are discussed. Performance implications for implementation technologies, and advanced problem solving techniques such as those employed in machine learning, and model/view/controller distinctions, various issues concerning multithreaded systems, I/O, exception handling, and distributed computing.

CSCI 222 Expert Systems and Applications 3.0 Spring
Prerequisites: CSCI 015B.

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 shells), and advanced problem solving techniques such as those employed in machine learning and knowledge acquisition.

CSCI 223 Artificial Intelligence 3.0 Fall
Prerequisites: Grade C- or better in CSCI 151.

An introduction to the basic principles, techniques, and applications of Artificial Intelligence. Coverage includes knowledge representation, logic, reasoning, 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.

CSCI 224 Robotics and Machine Intelligence 3.0 OddFall
Prerequisites: CSCI 015B.

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 lecture, 2.0 hours activity.

CSCI 231 Computer Graphics Programming 3.0 Fall
Prerequisites: CSCI 151.

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.

CSCI 232 Graphical User Interface Design 3.0 Fall
Prerequisites: CSCI 151.

Design of graphical user interfaces. Topics include issues, theories, principles, and guidelines in human-computer interaction; user interface design considerations and strategies; and techniques for evaluating user interfaces.

CSCI 233 Graphical User Interface Implementation 3.0 Spring
Prerequisites: CSCI 151.

Implementation of graphical user interfaces using object-oriented programming. Topics include event handling, the use of color, graphics contexts, text, fonts, and dialog boxes.

CSCI 240 Computer Animation 3.0 Fa/Spr
Prerequisites: CSCI 040 and CSCI 140 or permission of instructor.

For both majors and non-majors. The concepts of computer imaging and animation are taught in this project-based class. Focus is on the principles of animation and how they apply to computer animation techniques. This class emphasizes both creative and technical skills. 1.0 hour discussion, 4.0 hours activity.

CSCI 241 Advanced Animation Production 3.0 Fa/Spr
Prerequisites: CSCI 040, CSCI 140, CSCI 240.

The computer animation production process is taught in this class. Working from a script, storyboard, and/or animatic, students create an "animated short" with accompanying sound, music, and visual effects. Emphasis is on working as a member of a computer animation team, similar to a real-world production facility. 1.0 hour discussion, 4.0 hours activity.

CSCI 245 Web Programming Fundamentals 3.0 Spring
Prerequisites: CSCI 151.

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. Use of direct client-to-server network communication, performance implications for implementation technologies, and techniques for increasing web site security are discussed.

CSCI 250 Compiler Design 3.0 Fa/Spr
Prerequisites: CSCI 015B.

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.

CSCI 256 Theory of Computing 3.0 Fa/Spr
Prerequisites: MATH 129.

An introduction to formal languages, grammars, and automata theory with unsolvable problems.

CSCI 257 Fundamental UNIX System Administration 3.0 Spring
Prerequisites: CSCI 157 or permission of instructor.

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 discussion, 2.0 hours activity.

CSCI 270 Systems Design 3.0 Fall
Prerequisites: CSCI 112.

Methods related to the functional design of complex computer systems. Emphasis is on the project-team design approach. Operational criteria, system feasibility, requirements, and cost trade-offs. Integration of personnel, equipment, hardware, and software.

CSCI 272 Multi-User Operating Systems 3.0 Fall
Prerequisites: CSCI 152 or permission of instructor.

An analysis of multi-user operating systems, to include an in-depth study of current techniques used by a specific multi-user OS.

CSCI 273 Database Management 3.0 Fa/Spr
Prerequisites: CSCI 015B.

This course provides an introduction to the theory and methodology for database design and implementation. Topics may include a survey of various components of current database management systems. The course then focuses on a procedural database programming language including control structures, composite datatypes, implicit cursors, exception handling, and writing embedded SQL applications. 2.0 hours discussion, 2.0 hours activity.

CSCI 276 Advanced Database Management Systems 3.0 Fall
Prerequisites: CSCI 273 or MINS 118.

Course topics include database application programming using high-performance, high concurrency multi-user database management systems. 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 discussion, 2.0 hours activity.

CSCI 277 Advanced Network Management 3.0 Spring
Prerequisites: CSCI 157 or permission of instructor.

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 administration. The course provides hands-on experience on network management in a lab environment.

CSCI 278 Computer Networks 3.0 Fa/Spr
Prerequisites: CSCI 152.

Covers the concepts, vocabulary, design issues, and techniques currently used in the area of computer networks. Topics include history and evolution, transmission media, interconnection topology, control methods, protocols, types of nodes, network interfaces, performance analysis, diagnosis and maintenance, taxonomy, bridges, and gateways. Case studies of existing state-of-the-art networks are included.

CSCI 280 Digital Logic Design Theory 3.0 Spring
Prerequisites: CSCI 171.

An introduction to digital design for hardware for digital systems. Understanding the problem and developing a systematic solution for the systems’ data path architecture and its sequential control circuits are emphasized. Students will design and simulate useful digital systems using a Computer-Aided design tool.

CSCI 289 Advanced Topics in Computer Science 1.0-3.0 Fa/Spr
Prerequisites: CSCI 015B. This course is a special topic offered as 298A-C for 1.0 to 3.0 units respectively. Exploration of selected topics in computer science. Consult semester schedules for specific listings. Credit/no credit grading only.

CSCI 299H Honors Research Project/Thesis 3.0 Fa/Spr
Prerequisites: Open only to juniors and seniors in 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.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
<th>Prerequisites</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSCI 309</td>
<td>Topics in Programming Language Theory</td>
<td>3.0</td>
<td>Inquire</td>
<td>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.</td>
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<tr>
<td>CSCI 310</td>
<td>Software Metrics and Control</td>
<td>3.0</td>
<td>Inquire</td>
<td>Software development: planning, cost estimation, and control. Software metrics, configuration management, and quality controls. Reviews and walkthroughs.</td>
</tr>
<tr>
<td>CSCI 312</td>
<td>Software Engineering</td>
<td>3.0</td>
<td>Fall</td>
<td>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.</td>
</tr>
<tr>
<td>CSCI 315</td>
<td>Distributed Computing</td>
<td>3.0</td>
<td>Spring</td>
<td>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, servents, and client/server programming with enterprise and application servers.</td>
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<tr>
<td>CSCI 319</td>
<td>Topics in Software Engineering</td>
<td>3.0</td>
<td>Inquire</td>
<td>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.</td>
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<tr>
<td>CSCI 322</td>
<td>Programming in Artificial Intelligence</td>
<td>3.0</td>
<td>EvnSprg</td>
<td>This course includes writing new programs and extending previously implemented AI systems. Topics include the constructs of an AI programming language and studies in conjunction with expert system shell development, constraint propagation systems, inference engines, and others.</td>
</tr>
<tr>
<td>CSCI 323</td>
<td>Theory of Artificial Intelligence</td>
<td>3.0</td>
<td>OddSprg</td>
<td>An in-depth study of current techniques, applications, and issues in artificial intelligence. Suitable topics include advanced knowledge representation; natural language understanding; machine learning; theory of functional programming; cognitive science; neural networks; philosophy and artificial intelligence.</td>
</tr>
<tr>
<td>CSCI 329</td>
<td>Topics in Artificial Intelligence</td>
<td>3.0</td>
<td>Inquire</td>
<td>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.</td>
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<tr>
<td>CSCI 331</td>
<td>Computer Graphics</td>
<td>3.0</td>
<td>Spring</td>
<td>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.</td>
</tr>
<tr>
<td>CSCI 332</td>
<td>Digital Image Processing</td>
<td>3.0</td>
<td>EvnSprg</td>
<td>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.</td>
</tr>
<tr>
<td>CSCI 339</td>
<td>Topics in Computer Graphics</td>
<td>3.0</td>
<td>Inquire</td>
<td>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.</td>
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<tr>
<td>CSCI 349</td>
<td>Topics in Networking</td>
<td>3.0</td>
<td>Inquire</td>
<td>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.</td>
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<tr>
<td>CSCI 350</td>
<td>Compiler Theory</td>
<td>3.0</td>
<td>Fall</td>
<td>Compile and run-time organization for major language structures such as records, arrays, and control structures. Optimization techniques include peephole, common subexpression elimination, constant folding, reduction-in-strength, code motion, loop unrolling, register tracking, generating code from trees, and generating code from DAGS.</td>
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<tr>
<td>CSCI 356</td>
<td>Design and Analysis of Algorithms</td>
<td>3.0</td>
<td>Fall</td>
<td>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 N-P-completeness.</td>
</tr>
<tr>
<td>CSCI 359</td>
<td>Topics in Computer Theory</td>
<td>3.0</td>
<td>Inquire</td>
<td>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.</td>
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<tr>
<td>CSCI 369</td>
<td>Topics in Computer Architecture</td>
<td>3.0</td>
<td>Inquire</td>
<td>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.</td>
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<tr>
<td>CSCI 372</td>
<td>Operating Systems</td>
<td>3.0</td>
<td>Spring</td>
<td>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.</td>
</tr>
<tr>
<td>CSCI 374</td>
<td>Distributed Database Management Systems</td>
<td>3.0</td>
<td>Inquire</td>
<td>This course covers the theory, algorithms, and methods that underlie distributed database management systems. Emphasis is placed on design issues, query decomposition and optimization, transaction management, concurrency and reliability, and current trends in distributed DBMS's.</td>
</tr>
<tr>
<td>CSCI 379</td>
<td>Topics in Database Systems</td>
<td>3.0</td>
<td>Inquire</td>
<td>This course is an independent study offered as 397A-C, for 1-3 units respectively. 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. 3.0 hours supervision, 2.0 hours activity.</td>
</tr>
<tr>
<td>CSCI 380</td>
<td>Computer Architecture</td>
<td>3.0</td>
<td>Spring</td>
<td>This course is a master's study offered as either a Master's Thesis, identified as 399G-L for 1.0 to 6.0 units respectively. 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 Study (399) courses earn a Credit grade upon completion.</td>
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