



Department of Computer Science

Undergraduate Handbook

Fall 2008 Edition



Your Key To Success

California State University, Fullerton
Fullerton, CA 92834-6870

Table of Contents

Introduction.....	3
Computer Science.....	3
The Department	4
Advisement	5
Required Advisement	5
First-Time Freshmen	5
Undergraduate Transfers	5
Nearing Graduation (one year)	6
Probation.....	6
General Advice.....	6
Placement Examinations	7
Computer Science Placement Examination.....	7
Mathematics Qualifying Examination (MQE)	7
Required Courses for Major	9
Computer Science Prerequisite Tree	9
Computer Science Core	10
Lower Division Core (18 units)	10
Upper Division Core (28 units).....	10
Examination in Programming Proficiency (EPP)	11
Upper Division Writing Requirement	11
Elective Track Requirements.....	12
Multimedia and Digital Games (MG)	12
Internet and Enterprise Computing (IE).....	12
Software Engineering (SE).....	13
Scientific Computing (SC).....	13
Customized (CT).....	13
Independent Study.....	14
Mathematics and Science	14
Mathematics	14
Science	14
General Education	15
General Education Framework.....	15
Minimum Academic Standing.....	16
Course Transfer	16
Courses by Semester Sample	17
Required Courses For Minor.....	19
Internships.....	21
Student Services and Activities.....	23
Open Computer Labs.....	23
Computer Accounts	23
Scholarship Information	23
Computer Science Organizations	24
Association for Computing Machinery (ACM)	24
The Upsilon Pi Epsilon (UPE)	24
Video Game Design Club	25
Software Engineering Organization	25

The Computer Science Department	27
Full-Time Faculty.....	29
Course Descriptions	33
Computer Science Courses	33
Related Courses for Computer Science Majors	40
Appendix A Progress Check Sheet	43

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Introduction

Computer Science

Computer Science is the systematic study of computing systems and computation. The body of knowledge contains the theoretical foundation for understanding computing systems and methods, design methodology, algorithms, and software and hardware tools.

The Department of Computer Science offers these unique programs, which balance the theory and practice of computer systems:

- Bachelor of Science in Computer Science
- Master of Science in Computer Science
- Master of Science in Software Engineering.
- Minor in Computer Science

These programs cover a wide range of areas, including:

- multimedia and digital game technologies
- Internet and enterprise computing
- wireless and mobile computing
- databases and data mining
- computer security
- software engineering
- computational bioinformatics.

Computer Science prepares graduates for rewarding careers in all areas of business, government, education and industry. These organizations, large and small, need computer professionals to address their needs with specific programs and systems. Computer science professionals tackle complicated problems and create computer solutions to solve them, devising new ways to use computers. They apply their knowledge of computers and computational methods to build new systems such as:

- a navigation system for a new space vehicle
- a marketing research and analysis program for a large corporation
- a loan analysis system for a bank
- computer networking and Internet solutions
- database systems
- Internet application systems
- digital games
- intelligent systems (robots and computer vision)
- programs for deciphering the secrets of our DNA

The Department

We offer high-quality degree programs in Computer Science that maintain a good balance between the theory behind the fundamental concepts and the technology of applying those concepts. You will gain a balanced knowledge of the two, so that you understand today's technology and have the foundation needed to adapt to tomorrow's advances.

The Computer Science Department offers these four programs:

- Bachelor of Science in Computer Science
- Master of Science in Computer Science
- Master of Science in Software Engineering
- Minor in Computer Science

Accreditation: The Bachelor of Science in Computer Science degree at Cal State Fullerton is accredited by the Computer Accreditation Commission of ABET, 111 Market Place, Suite 1050, Baltimore, MD 21202-4012 – telephone: (410) 347-7700.

This handbook covers information on how to earn a bachelor or minor degree, and contains information relevant to students pursuing them. If you are entering the Computer Science graduate program, please trade this handbook in for the Graduate Handbook.

The Computer Science program provides you with a solid computing knowledge foundation, and an opportunity for specialization within the field. We are bound by six objectives, which define the bases of our curriculum:

- development of the ability to work effectively as an individual or as a team member to produce correct, efficient, well-organized and documented programs in a reasonable time;
- development of the ability to recognize problems that are amenable to computer solutions, and knowledge of the tools necessary for solving such problems;
- development of the ability to assess the implications of work performed;
- development of an understanding of basic computer architecture and operations;
- preparation to pursue in-depth training in one or more application areas, or further education in computer science, and
- development of the ability to write and speak effectively.

Advisement

It can be frustrating to find out that you took a class that wasn't useful for your course of study. Not being able to take a class when you want because of a needed prerequisite is even worse—it slows your progress and can delay your graduation.

To avoid problems like these, the University offers advisement counseling to all students. This is your opportunity to review your progress toward your degree and to discuss electives that match your career goals. Advisers are your guides throughout your academic career, and they are much more qualified to assist than the person sitting next to you in English 101 class.

You have to set up an advisement appointment yourself. Visit the Computer Science office (CS-522) or contact us at (714) 278-3700 and ask for an advisement appointment.

During your advisement, the department adviser will write all important decisions and advice on an *Advising Session Notes* form. You will receive a copy of this form, and the original will go into your file. Make sure that this record covers all of the important information that was discussed.

If you have any questions about General Education classes, the campus Academic Advising Center, UH-123, has well-qualified people to assist you.

Required Advisement

We strongly recommend that you seek advisement at least once a year or every 30 units to make sure that you're on the right track, taking courses in the proper sequence without missing any prerequisites.

Caution

If you don't see an advisor every year, the Computer Science Department will place a hold on your registration and you will not be allowed to register for any courses until you consult the department adviser.

First-Time Freshmen

You should make an appointment to see the department adviser as early as possible. It's very important that you understand the program and the sequence in which you should take courses.

Undergraduate Transfers

You should make an advisement appointment as early as possible. The department adviser can answer your questions about transfer credit for general education courses and can evaluate courses that apply to your major. Please bring any transcripts or grade reports you have, official or not, to this appointment. A catalog from your prior institution may prove useful, particularly from those outside the Orange County area.

For up-to-date information on equivalent courses, please visit <http://www.assist.org>.

Nearing Graduation (one year)

At least a year before you expect to graduate, you must file a Graduation Requirements Check (Grad Check). You cannot graduate without a completed Grad Check. The current University Catalog has more information about grad checks—look up *graduation check* in the index.

When you receive your grad check in the mail, bring both copies to the department office. The Undergraduate Coordinator will complete a section of this grad check, specifying any courses you still need to take to complete your major.

Probation

If you are on probation, it is definitely time to see an adviser. Until you do so, a hold will be in place on your file, preventing you from registering in classes. Your adviser will discuss with you the problems that led to your probation and review strategies you should take to get off probation. Make your advisement appointment early so your registration is not held up.

General Advice

Be sure to follow the course requirements for your catalog year. Your catalog year is determined by the Admissions Office and is a part of your student records. Typically, this is the year you began college; occasionally an adviser may approve a later year. If your catalog year precedes 2006, you should obtain the appropriate handbook supplement from the Computer Science Department.

Placement Examinations

In many subjects of study at CSUF, there are multiple classes in which you may begin your studies depending upon your previous experience and studies. The University has developed placement examinations that may be used to determine the best starting point for you. It is essential that you be placed in the right course! Starting out too low where you will not learn anything new is a waste of time. Starting out too high can be frustrating and stressful.

For the Computer Science undergraduate student, there are two important placement exams: the *Computer Science Placement Examination*, and the *Mathematics Qualifying Examination*. In both cases, you must either take the exam, or meet one of the exceptions described below.

Computer Science Placement Examination

There are three possible starting courses for Computer Science students.

1. You may sign up for Computer Science 120 if you have experience with computer use but no programming experience.
2. You may sign up for Computer Science 121 if:
 - You have passed CPSC 120, or equivalent course with C- or better
3. You may sign up for Computer Science 131 if:
 - You have passed CPSC 121, or equivalent course with C- or better, OR
 - You took the Advanced Placement (AP) test in Computer Science A and scored at least 3.

If none of the above applies to you, you must take the Computer Science Placement exam to determine the class you should begin your studies with.

For additional information, please contact the Computer Science Department Office (CS-522, 714-278-3700, csoffice@ecs.fullerton.edu).

Mathematics Qualifying Examination (MQE)

Before enrolling in Math 150A, you must either have recently passed Math 125 (Pre-calculus), or an equivalent course at another institution, or passed the Mathematics Qualifying Exam. Additional information on this exam is available in the Schedule of Classes, and from the Fullerton Testing Center, University Hall 229, and (714) 278-3838.

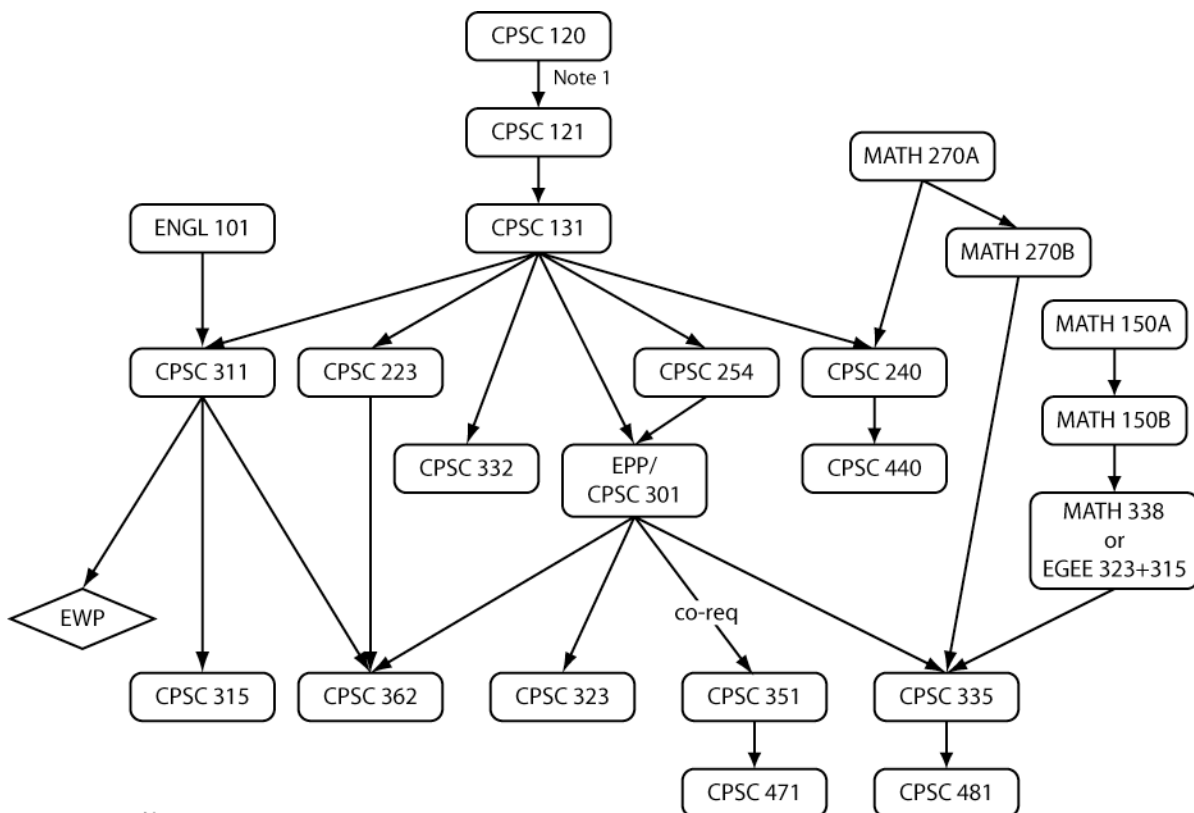
Required Courses for Major

The B.S. degree program in Computer Science meets the knowledge units recommended by the professional accreditation body, ABET and professional societies, ACM and IEEE, and addresses the current technology and new advancements.

The B.S. degree in Computer Science requires 124 units of course work in the following categories:

- Computer Science Core (46 units)
- Computer Science Technical Electives (15 units)
- Mathematics and Science (30 units)
- General Education (33 units)

Computer Science Prerequisite Tree



Note:
 1. You may skip this course if you have already taken a similar course or have passed the Computer Science Placement Examination, but you will have to take an additional elective course to satisfy the 124 unit graduation requirement.

Computer Science Core

Lower Division Core (18 units)

CPSC 120	Introduction to Programming ¹
CPSC 121	Programming Concepts
CPSC 131	Data Structures Concepts
CPSC 223	Object-oriented Programming Language ²
CPSC 240	Computer Organization and Assembly Language
CPSC 254	UNIX and Open Source Systems

Upper Division Core (28 units)

CPSC 311	Technical Writing for Computer Science
CPSC 315	Social and Ethical Issues in Computing
CPSC 323	Programming Language and Translation
CPSC 332	File Structures and Database Systems
CPSC 335	Problem Solving Strategies
CPSC 351	Operating Systems Concepts
CPSC 362	Software Engineering
CPSC 440	Computer System Architecture
CPSC 471	Computer Communications
CPSC 481	Artificial Intelligence

Notes

1. Basic Programming Course Exemption

Computer Science 120 (Introduction to Programming) can be waived if you have already taken an equivalent course or pass the Computer Science Placement Exam, which is described in an earlier section. If this course is waived, you will need to take an elective course to meet the 124 unit degree requirements.

2. Object-Oriented Programming Language

You must take 3 units of a modern object-oriented programming language course other than C++. Computer Science 223J (Java Programming), 223H (Visual Basic Programming), or 223N (C# Programming) meets this requirement.

Examination in Programming Proficiency (EPP)

You must pass the Examination in Programming Proficiency (EPP) before taking most of the 300-level and 400-level Computer Science courses. This examination determines whether you have the basic programming skills needed to succeed in upper division courses. It focuses on the concepts and skills covered in CPSC 121 and CPSC 131.

The EPP is given as part of CPSC 301 (Programming Lab Practicum). You must register in CPSC 301 and attend the first two weeks of the course. After an orientation meeting at the first class meeting, you will take a two-part exam during the second and third class meetings. You will be notified at the fourth meeting whether you have passed or not. If you pass, you may drop the course before the end of the second week of classes. You are responsible for dropping the class; you will not be automatically dropped if you pass the exam. If you don't pass, you must continue in CPSC 301 and work on your programming skills. Passing CPSC 301 is equivalent to passing the Examination in Programming Proficiency.

The EPP is a prerequisite or co-requisite for several 300-level core courses as shown in the prerequisite tree at the front of this chapter. These courses are prerequisites in turn for other 300- or 400-level courses. The EPP is a prerequisite for the remaining 400-level courses that aren't in this thread, except for CPSC 440 (Computer System Architecture). There are very few upper-division courses that you can take without passing the EPP or CPSC 301. You should consult the Department Office for advisement.

Upper Division Writing Requirement

The University requires every bachelor degree candidate to take an upper division writing course and the English Writing Proficiency (EWP) examination, which is a written essay. Consult www.fullerton.edu/testing/ewp.htm for more information, such as test dates. CPSC 311 (Technical Writing for Computer Science) meets the writing course requirement. You should take it in the same semester that you take the EWP, so that you benefit from the course's discussion of the exam and the assistance that your instructor can give you.

You cannot take the EWP until you reach upper division standing and you should take it before your senior year. You may retake the examination until you pass it. If you fail two or more times, you may take English 199 (Intensive Writing Review) to satisfy this requirement. This course does not count towards graduation and it does not satisfy the writing course requirement, but passing it is equivalent to passing the EWP.

Elective Track Requirements

Computer Science is a very broad field and the technologies in each area change rapidly. Elective tracks provide you with flexible choices of elective courses so you can quickly adapt to rapid technology advancements and meet your professional goals.

You must select an elective track aimed at your specific career goals. There are five tracks to choose from:

- Multimedia and Digital Games
- Internet and Enterprise Computing
- Software Engineering
- Scientific Computing
- Customized

You may need to take an additional elective course if you skipped CPSC 120, in order to complete the required number of computer science units.

Multimedia and Digital Games (MG)

Interactive entertainment and computer-animated visual effects are now part of our mainstream culture. Creating such sophisticated computer graphics in the video games and animations requires a delicate blending of art with science by teams of highly skilled professionals. Artists, animators, writers, designers, and software developers work long hours with cutting-edge technology and tools. This track gives you the necessary skills in multimedia/digital animation and simulation, human/computer interfaces, digital game development and production. You must take these courses:

- CPSC 386 Introduction to Game Design & Production
- CPSC 484 Principles of Computer Graphics
- CPSC 486 Game Programming
- CPSC 487 Advanced Game Programming
- CPSC 489 Game Development Project

Internet and Enterprise Computing (IE)

Internet is an essential technology for most computer users. Although Internet technology provides many people with convenience and opportunity, it provides computer scientists with challenges since the Internet applications must be scalable, distributed, secure, and high performance. This track gives you the skills needed to develop enterprise-wide Internet applications using current technologies. You must take these courses:

- CPSC 431 Database and Applications
- CPSC 473 Web Programming and Data Management
- CPSC 474 Distributed Computing using Web Service and .NET Remoting
- CPSC 476 Java Enterprise Application Development
- Any adviser-approved 3 unit 300/400 level Computer Science course

Software Engineering (SE)

Software engineering is the discipline of developing and maintaining large software systems that behave reliably and efficiently. Recently it has evolved in response to the increased importance of software in safety-critical applications and to the growing impact of large and expensive software systems in a wide range of situations. This track will prepare students to have necessary skills on how to assess customer needs, and develop usable and high quality software that meets those needs, and manage large scale of software development projects. To complete this track, students must take the following courses:

- CPSC 462 Software Design
- CPSC 463 Software Testing
- CPSC 464 Software Architecture
- CPSC 466 Software Process
- Any adviser-approved 3 unit 300/400 level Computer Science course

Scientific Computing (SC)

Scientific Computing is the field of study concerned with constructing mathematical models and numerical solutions, using computers to solve scientific and engineering problems that typically require massive amounts of computation.

This track gives you the skills needed to construct mathematical models, adapt numerical solutions, and develop computer software to solve scientific and engineering problems. You must take these courses:

- Math 250A Multivariate Calculus
- Math 250B Introduction to Linear Algebra & Differential Equations
- Math 340 Numerical Analysis
- Math 370 Mathematical Model Building
- Any adviser approved 3 unit 400-level Computer Science course

Completing the Mathematics courses listed above also meet the Mathematics minor requirements.

Customized (CT)

This track provides you with great flexibility to build your knowledge and skills in special areas of interest. You can use it to meet the requirements of specific industry sectors or companies, or your personal academic goals.

You may take any adviser-approved combination of 15 units of upper-division (300/400) courses selected from any elective track or this list:

- CPSC 303 Multimedia Concepts
- CPSC 322L Introduction to Computer-Aided Design
- CPSC 376 Client/Server systems with Java
- CPSC 433 Data Security and Encryption Techniques
- CPSC 459 Micro-Computer Software Systems
- CPSC 483 Data Mining and Pattern Recognition
- CPSC 485 Computational Bioinformatics
- CPSC 491T Variable Topics in Computer Science

- CPSC 495 Internship in Computer Science
- CPSC 499 Independent Study

At least 9 units of the selected courses must be 400-level Computer Science courses. No more than 3 units of the courses can be 490–499 courses.

Independent Study

You may take CPSC 499 Independent Study to fulfill part of your electives. This course allows you to pursue topics of special interest beyond those of a regular course.

You must submit an Application For Independent Study to the department office, which will supply the form. The application must include a study plan and objectives, and must be approved by a supervising full-time faculty member and by the department chair.

You may take up to three units per semester, and apply a maximum of three units towards the degree. The University allows a maximum of nine units, but the Computer Science Department allows only three units.

You will not be able to register on-line for this course until the Computer Science Department Office grants permission to do so. You should call to verify that this has been done.

Mathematics and Science

The Accreditation Board for Engineering and Technology (ABET), the professional body that accredits our Computer Science program, requires 30 units of mathematics and science courses.

Mathematics

You must take the following mathematics courses:

MATH 150A, 150B	Analytic Geometry and Calculus (4, 4 units)
MATH 270A, 270B	Mathematical Structures (3, 3 units)
MATH 338	Statistics Applied to Natural Sciences (4 units)

Note: You must demonstrate qualifications before you may enroll in Mathematics 150A. Please refer to the prior section about the Mathematics Qualifying Examination (MQE) for additional information.

Science

You must take the following biology course and lab:

BIOL 101	Elements of Biology (3 units)
BIOL 101L	Elements of Biology Lab (1 units)

You must take one of these physical science series:

PHYS 225, 225L	Fundamental Physics: Mechanics (3, 1 units)
PHYS 226, 226L	Fundamental Physics: Electricity and Magnetism (3, 1 units)

or

CHEM 120A	General Chemistry (5 units)
CHEM 125	General Chemistry for Engineers (3 units)

or

GEOL 101, 101L	Physical Geology (3, 1 units)
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General Education

Your education can't be confined to the Computer Science building. To earn any bachelor's degree, you must venture forth to the rest of the campus and achieve a *General Education*. The University usually requires a minimum of 51 semester units of general education courses, selected from an approved list and taken for a letter grade. However, the Computer Science Department has an exception for 6 units, reducing that requirement to 45 units. The Mathematics and Science courses described in the previous section cover 12 of those units, leaving a remainder of 33 units.

If you are a transfer student, at least 9 units of your general education courses must be at the upper division level—course numbers in the 300s and 400s. They must be taken in residence at CSUF after you have reached junior standing (when you have completed 60 units total).

You have many options available to fulfill the University's general education requirements. The University Catalog has a chapter devoted to these requirements. An updated list of approved general education courses is published in the Fall and Spring class schedules. Academic Advising, in room UH-123, has advisers who can help you understand and meet these requirements.

General Education Framework

The table below contains a recommended set of courses that follows the University Catalog's description of general education requirements.

I. Basic Subjects

A. Oral Communication	<i>Human Comm 102 (Public Speaking)</i>	3
B. Written Communications:	<i>English 101 (Beginning College Writing)</i>	3
C. Critical Thinking	<i>Philosophy 106 (Introduction to Logic)</i>	3

II. Historical And Cultural Foundations

A. The Development Of Civilization	<i>History 110A or 110B (World Civilizations to the 16th Century) or (World Civilizations Since the 16th Century)</i>	3
B. American History, Institutions And Values		
1. American History	<i>American Studies 201 (Introduction to American Studies)</i>	3
2. Government	<i>Political Science 100 (American Government)</i>	3

III. Disciplinary Core Courses

A. Mathematics And Natural Sciences

The courses described in the Mathematics and Science section cover this 12-unit requirement.

B. Arts And Humanities

1. Introduction to the Arts	<i>Music 101 (Music Theory for Non-Music Majors) or Art 101 (Introduction to Art)</i>	3
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2. Introduction to the Humanities	<i>Choose any course in this category</i>	3
3. Implications, Explorations and Participatory Experience in the Arts	<i>Philosophy 312 (Ethics)</i>	3
C. Social Sciences		
1. Introduction to the Social Sciences	<i>Economics 100 (The Economic Environment)</i>	3
2. Implications and Explorations in the Social Sciences	<i>American Studies 301 (American Character)</i>	<u>3</u>
		Total: 33

- Notes: 1. *American Studies 301* satisfies the cultural diversity course requirement.
2. Courses in sections IA, IB, IC, and IIIA1 must be completed with C or better.

Minimum Academic Standing

Courses taken toward your major, including any applied general education courses, must be taken on a traditional letter grade basis. Exceptions are for courses that are only offered on a credit/no credit basis or courses that you passed by a challenge examination. All courses must be passed with a “C-” or better that are applied toward your major or that are prerequisites for a Computer Science course. The exception to this rule allows up to six units of “D-” on Technical Electives or Requirements in Mathematics and Science, but your GPA for courses required for your major must remain at or above 2.0. Please see the department adviser for details.

Course Transfer

If you’re a transfer student from a local community college, you should refer to the *Community College Equivalence Tables* in Appendix A. The department adviser can help you with these equivalencies and give the required approval. Please refer to the *Advisement* chapter’s section on *Undergraduate Transfers*.

Transfer courses cannot be applied toward the major or accepted as prerequisites until the Department receives a transcript from the college where the courses were taken. You can provide an unofficial copy of your transcript to the Department for short-term advising purposes, but you must provide an official transcript to the University as soon as it’s available. You should bring the sealed official transcript to the Department office so the staff can copy it and take it to University Admissions and Records.

Courses by Semester Sample

This sample four-year study plan will help you plan your path towards a B.S. degree in Computer Science. It's a guideline with a suggested sequence of Computer Science and General Education (GE) courses that can be used by most students, but you can adapt it to your personal needs and goals. There is a *Progress Check Sheet* in Appendix B which lists all of the classes required for the major. You can use it to track the progress of your education.

Semester 1	15 units	Semester 2	15 units
Oral Communication (GE IA) or English 101 (GE IB)	3	Oral Communication (GE IA) or English 101 (GE IB)	3
Math 270A (major)	3	Math 270B (major)	3
CPSC 120 (major)	3	CPSC 121 (major)	3
History 110A or 110B (GE IIA)	3	Critical Thinking (GE IC)	3
Intro to the Arts (GE IIIB1)	3	Intro to Humanities (GE IIIB2)	3

Note: Any remediation courses must be completed by the end of your second semester.

Semester 3	16 units	Semester 4	17 units
Math 150A (GE IIIA1 & major)	4	Math 150B (major)	4
CPSC 131 (major)	3	CPSC 223 option (major)	3
American History (GE IIB1)	3	CPSC 240 (major)	3
Political Science (GE IIB2)	3	CPSC 254 (major)	3
Intro to Social Sciences (GE IIIC1)	3	Biol 101+L (GE IIIA2a & major)	4

Semester 5	16 units
EPP or CPSC 301	CR/NC
Math 338 (GE IIIA3 & major)	4
CPSC 311 (major)	3
CPSC 332 (major)	3
Technical elective (major)	3
Upper division GE IIIC2	3

Semester 6	16-17 units
CPSC 351 (major)	3
CPSC 362 (major)	3
CPSC 440 (major)	3
Physics 225+L, or Chem 120A, or Geol 101+L (GE IIIA2 & major)	4~5
Technical elective (major)	3

Additional activities:

1. Take the English Writing Proficiency (EWP) examination.
2. File the *Graduation Check* form.

Semester 7	15-16 units
CPSC 335 (major)	3
CPSC 471 (major)	3
Technical elective (major)	3
Technical elective (major)	3
Physics 226+L, Chem 125, Or Geol 201+L (major)	3~4

Semester 8	13 units
CPSC 323 (major)	3
CPSC 481 (major)	3
CPSC 315 (major)	1
Technical elective (major)	3
Upper division GE IIIB3	3

Notes:

1. You must pass GE courses in sections IA, IB, IC, and IIIA1 with a C or better.
2. One upper-division course in GE sections IIIB3 or IIIC2 must meet the cultural diversity requirement.
3. Technical electives need the department adviser's approval.

Required Courses For Minor

There is a high demand for computer skills in many industries, particularly in the business and scientific fields. The benefits aren't limited to these fields—a minor in Computer Science will complement any field of study.

To select Computer Science as your minor, visit the Computer Science office (CS-522) and fill out a *Request for Minor Objective* form.

You must take 15 units of Computer Science courses, including these four (12 units):

- CPSC 120 Introduction to Programming (3 units)
- CPSC 121 Programming Concepts (3 units)
- CPSC 131 Data Structures Concepts (3 units)
- CPSC 313 The Computer Impact (3 units)

You must also take an adviser-approved 3-unit 300/400 level Computer Science elective course.

You may have to take additional courses to meet the prerequisites for your Computer Science courses.

At least 6 units must be upper division (300/400 level) and completed at CSUF. At least 12 units must be courses that are not being used to fulfill requirements for your major.

Internships

Learning takes place in many settings, not just the classroom. When you complete your educational career and are entering the professional job market for the first time, extensive professional experience can be highly beneficial. For this reason, the University and the Computer Science Department maintain an active internship program as a service to all students interested in obtaining employment while still in school.

Benefits of the internship program in Computer Science include:

- Paid work or non-paid work experience in the computer field.
- Job placement assistance from the Center for Internships and Community Engagement (CICE).
- Up to 3 units of credit.

We recommend that you consider an internship when you reach junior or senior status. To do this:

1. Visit the CICE office located in LH-206.
2. Wait for a position. This wait is three months on average, so be sure to plan in advance!
3. Visit the Computer Science office and request enrollment in CPSC 495. This course is a variable unit course (1~3 units) and may be repeated any number of times, for up to three units.

If you are already employed in a position involving a significant amount of computer work, contact CICE to certify your position as suitable for internship credit. You may then enroll in CPSC 495 as described in step 3 above.

Student Services and Activities

Many activities and services exist for students at CSUF; ranging from job placement to the Pub. You may refer to the University Catalog for information about many of the campus-wide student activities and services. Described below are some of the activities and services available specifically for Computer Science students. Updated information is posted on the Computer Science Website at: <http://cs.fullerton.edu/>.

Open Computer Labs

The Computer Science Department maintains one open computer lab, which remains open for most of the standard campus operating hours. Signs posted on the door of the lab list its operating hours.

CS-200/CS-202 contains PCs with Internet access.

The University is equipped with a wireless network, which is accessible almost everywhere on campus except for dead zones such as the Arboretum and some distant parking lots. You can connect your laptop to this network by using your student portal's login name and password.

There is a campus wide computer center located in the basement of the library. This lab contains computers running the Windows and Macintosh operating systems. For more information about the campus computer center, just drop by or call the library at (714) 278-2633.

Computer Accounts

As a Computer Science student, you may get a special *Titan* computer account. Titan is a Unix based server used throughout the Computer Science Department and connected to the Internet. All functionality from email to surfing the World Wide Web is available through this account. To request a Titan account, just visit the Computer Science office in room CS-522 with your photo ID.

Scholarship Information

Most scholarships have specific requirements based on your GPA, citizenship, or affiliation with a minority group. Often an essay is also required. The money is to be used only for educational expenses.

The Assistant Dean for Student Services, College of Engineering and Computer Science, has current scholarship information and application forms in room CS-501 (phone 714-278-2887).

Computer Science Organizations

Association for Computing Machinery (ACM)

ACM (Association for Computer Machinery, founded 1947) is an international scientific and educational organization dedicated to advancing the art, science, engineering, and application of information technology, serving both professional and public interests by fostering an open interchange of information and by promoting the highest professional and ethical standards. The ACM student chapter at the University provides a continuing forum for the exchange of ideas and announcements for all the students on campus who share an interest in the diversified aspects of computing. Activities include field trips, programming contests, workshops, symposiums, games and tournaments.

For information on the chapter, you are welcome to drop by the office in room CS-209, to call (714) 278-7165, or to send email to acm@acm-csuf.org. ACM operates a home page at <http://acm-csuf.org>. The ACM home page contains many services and maintains links to other student services.

The ACM chapter is a student-run organization and its activities are open to all interested students. The club is successful only to the extent that students support it and participate in its activities.

The Upsilon Pi Epsilon (UPE)

Upsilon Pi Epsilon is the first and only international honor society in the Computing and Information Disciplines. It has received endorsements from the two largest computer organizations in the world, the Association for Computing Machinery (ACM) and the IEEE Computer Society (IEEE-CS). UPE is a member of the Association of College Honor Societies (ACHS). Members in this club share ideas and experience with other motivated computer science students, learn from computer scientists and professionals from other disciplines, and gain exposure to diverse and advanced computing and information science topics. As an honor society, UPE only grants membership to students at the top of their class. Some of the activities and benefits of being a member include:

- Field trips to major companies and research facilities
- Guest speakers from industry and academic organizations
- Shared information about graduate schools (with M.S. or Ph.D. degree programs)
- Shared knowledge and techniques among members
- Development of close relationships with faculty members for research and projects
- Meeting with other outstanding computer science students from our own university and from other universities

Every member receives a membership certificate, a carat-clad key pin, and a free one-year ACM student membership (current ACM members receive a one-year extension).

For more information on UPE and eligibility, please visit <http://www.o-upe.com>.

Video Game Design Club

The Video Game Design Club is a university recognized club, open to all CSU Fullerton students who have a passion for creating and playing video games. The club meets regularly during the academic year, organizing special events as well as student projects. To learn more about the club and to see the club calendar, visit the club's website at <http://www.csufgc.com/>.

Software Engineering Organization

SEO (Software Engineering Organization) was founded at California State University, Fullerton in Fall 2007. It was founded by CSUF students with a common vision to provide fellow computer science students with the software engineering knowledge necessary to succeed in the advancing technical fields. SEO aims to expose students to software engineering techniques while providing the vital experience necessary to be competitive within industry. With SEO guidance and software engineering knowledge, students will be able to make better informed strategic decisions for career paths within research or industry. Additionally, SEO provides a medium for exchanging information and ideas for those interested in software engineering.

SEO's mission is accomplished through the following activities:

- Workshops and seminars provided by chapter leaders or guests
- Participation in software engineering conferences worldwide
- Tours to research institutions or companies within industry
- Speakers from academia and industry
- Networking events among students, academia, and industry

For more information, please e-mail seo.csuf@gmail.com.

The Computer Science Department

The faculty and staff of the Computer Science Department welcome you into our program and sincerely wish you good luck on your journey into higher education, and continued success.

Whenever you have a question about the Department—its policies, its curriculum, its services, your progress, or anything else—feel free to contact us.

In person: Room CS-522

By telephone: (714) 278-3700

By FAX: (714) 278-7168

By e-mail: csoffice@ecs.fullerton.edu

On the Web: <http://cs.fullerton.edu/>

By mail: California State University, Fullerton
Department of Computer Science
P.O. Box 6870
Fullerton, CA 92834-6870

Full-Time Faculty

This chapter contains an alphabetical listing of all full-time faculty in the Computer Science Department, their educational background, their areas of interest, and their contact information:

Barua, Susamma – Ph.D., University of Cincinnati, Cincinnati, Ohio

Computer architectures and performance evaluation, neural networks, web-based database development, and computer networking;

Email: sbarua@fullerton.edu

Website: <http://ecs.fullerton.edu/~sbarua>

Chen, Ning – Ph.D., Colorado State University, Fort Collins, Colorado

Embedded systems, digital signal processing, robotics, real-time systems, and distributed systems;

Email: nchen@fullerton.edu

Choi, James – Ph.D., University of Southern California, California

Software engineering, reverse software engineering, process modeling, and configuration management;

Email: jchoi@fullerton.edu

Website: <http://ecs.fullerton.edu/~sjchoi>

Cong, Bin – Ph.D., University of Texas, Dallas, Texas

Computer network, parallel processing, neural networks, and heuristic search, software process models, and network security;

Email: bcong@ecs.fullerton.edu

Website: <http://ecs.fullerton.edu/~bcong>

Courellis, Spiros – Ph.D., University of Southern California, California

Computer network, network security;

Email: shc@ecs.fullerton.edu

Website: <http://ecs.fullerton.edu/~shc>

Falconer, David – Ph.D., University of Texas, Austin, Texas

Artificial intelligence, programming languages, and technical communications;

Email: falconer@fullerton.edu

Holliday, Allen – M.S. West Coast University, Los Angeles, California

Software engineering, project management, operating systems, data communication, and computer security;

Email: aholliday@fullerton.edu

Website: <http://allenh.ecs.fullerton.edu>

Holliday, Floyd – M.A., California State University, Long Beach, California

OOP Software engineering, embedded systems, and web-based application;

Email: holliday@ecs.fullerton.edu

Jo, Chang-Hyun – Ph.D., Oklahoma State University, Oklahoma

Programming languages, software engineering, and Internet/Web programming;

E-mail: jo@ecs.fullerton.edu

Website: <http://ecs.fullerton.edu/~jo>

Laguna, Barbara – M.S., California State University, Fullerton, California

Fractal geometry, data structures, analysis of algorithms, and social issues of computer technology;

Email: laguna@ecs.fullerton.edu

Website: <http://ecs.fullerton.edu/~laguna>

Michalopoulos, Demetrios – Ph.D., University of Southern California, California

Pattern recognition, image processing, graphics, intelligent systems, artificial intelligence application, and web application;

Email: dimitri@fullerton.edu

Molodowitch, Mariko – Ph.D., University of California, Irvine, California

Design and analysis of algorithms, parallel algorithms, graph algorithms, and probabilistic analysis;

Email: mmolodowitch@fullerton.edu

Website: <http://ecs.fullerton.edu/~mariko>

Ryu, Tae-Wan – Ph.D., University of Houston, Houston, Texas

Databases, data/text mining, time-series forecasting, evolutionary computation, Internet computing, and software project management with metrics;

Email: tryu@fullerton.edu

Website: <http://ecs.fullerton.edu/~tryu>

Shafae, Michael – Ph.D., University of California, Irvine

Computer graphics & computer games

Email: see website

Website: <http://mshafae.ecs.fullerton.edu/>

Wang, Xiong – Ph.D., New Jersey Institute of Technology, Newark, New Jersey

Databases, knowledge discovery and data mining, pattern matching, and bioinformatics

Email: xwang@fullerton.edu

Website: <http://ecs.fullerton.edu/~wang>

Course Descriptions

Computer Science Courses

CPSC 103 Introduction to Personal Computer Applications (3 units)

Prerequisite: None.

Introduction to use and application of personal computers: word processing, spreadsheets, database systems, e-mail systems and World Wide Web. Evaluation of personal computers and software. (2 hours lecture, 2 hours laboratory)

CPSC 120 Introduction to Programming (3 units)

Corequisite: Math 125

Introduction to the concepts underlying all computer programming: design and execution of programs; sequential nature of programs; use of assignment, control, and input/output statements to accomplish desired tasks; design and use of functions. Structured and object-oriented methodologies (1.5 hours lecture, 3 hours laboratory).

CPSC 121 Programming Concepts (3 units)

Prerequisite: CPSC 120 or sufficient score on the Computer Science Placement Exam.

Introduction to programming of digital computers; subroutines, functions, and structure of algorithms; elementary input/output; arrays; strings and data types; classes and objects; documentation. (2 hours lecture, 2 hours laboratory)

CPSC 131 Data Structures Concepts (3 units)

Prerequisites: CPSC 121 or sufficient score on the Computer Science Placement Exam.

Data structures: list, stacks, queues, linked structures, binary search trees, hashing, graph, sorting and searching. Implementation and use of basic data structures.

CPSC 223H Visual BASIC Programming (3 units)

Prerequisite: CPSC 131.

Elements of Visual Basic, forms and controls, properties, mouse events, multiple-document interface, processing files, accessing databases, dynamic data exchange, object linking and embedding. (2 hours lecture, 2 hours laboratory)

CPSC 223J Java Programming (3 units)

Prerequisite: CPSC 131.

Characteristics of Java: portable, robust, secure, object-oriented, high performance; using the Java environment; server administration; types, expressions, and control flow; classes, interfaces, and packages; threads; exceptions; class libraries; Java for the Internet; tools; the Java Virtual Machine. (2 hours lecture, 2 hours laboratory)

CPSC 223N C# Programming (3 units)

Prerequisite: CPSC 131.

Characteristics of C#, object-oriented design concepts, control structures, methods, arrays, classes, objects, inheritance, polymorphism; exception handling; class graphic user interfaces, multithreading, characters, strings, files, streams. Software development assignments (2 hours lecture, 2 hours laboratory)

CPSC 240 Computer Organization and Assembly Language (3 units)

Prerequisites: CPSC 131 and either Mathematics 270A or Mathematics 280.

Digital logic and architecture of a computer system, machine level representation of data, memory system organization, structure of low-level computer languages. machine, assembly, and macro language programming. principles of assembler operation, input-output programming, interrupt/exception handling. Laboratory programming assignments. (2 hours lecture, 2 hours laboratory)

CPSC 253U Workshop in UNIX (1 unit)

Prerequisite: CPSC 121 or EGME 205.

Workshop in the use of the UNIX operating systems. Offered Credit/No Credit only (2 hours activity)

CPSC 254 UNIX and Open Source Systems (3 units)

Prerequisite: CPSC 131.

Introduces the UNIX operating systems, various open source applications and systems, open source programming languages, and open source software development techniques. (2 hours lecture, 2 hours laboratory)

CPSC 301 Programming Lab Practicum (2 units)

Prerequisite: CPSC 131; and CPSC 253U or CPSC 254.

Intensive programming covering concepts learned in lower division courses. Includes procedural and object-oriented design, documentation, arrays, classes, file input/output, recursion, pointers, dynamic variables, data and file structures.

CPSC 303 Multimedia Concepts (3 units)

Prerequisites: 121 and completion of the General Education Critical Thinking requirement.

Components and issues associated with multimedia technology, applications of multimedia and its evolution. Laboratory activities will include developing a multimedia application using a PC-based authoring tool. (2 hours lecture, 2 hours laboratory)

CPSC 311 Technical Writing for Computer Science (3 units)

Prerequisites: ENGL 101 and CPSC 131.

Practice in developing documentation skills as used in the computer field. Topics include proposals, feasibility studies, user guides and manuals, business communication and technical presentation. Case studies in professional ethics. Both written and oral reports are required.

CPSC 313 The Computer Impact (3 units)

Prerequisite: Upper division standing, one course from General Education category III.A.2.

Effect of computer use on individuals and organizations. Side effects of innovative technology and the resulting changes to organizations, social institutions, and human perceptions of events. Emphasis on personal responsibility, legal ramifications, and educational implications. Hands-on use of e-mail and the World Wide Web.

CPSC 315 Social and Ethical Issues in Computing (1 unit)

Prerequisite: CPSC 311.

The course will cover relevant issues that responsible professionals will face in a complex technological society. Issues covered are professional ethics, computer control, encryption, benefits and downside of computers, privacy and computer crimes. Both written and oral reports are required.

CPSC 322L Introduction to Computer Aided Design (3 units)

Prerequisite: Adviser Approval.

Introduction to modeling, assembly, design documentation and analysis using typical commercial CAD/CAE software such as Mechanical Desktop, Pro/ENGINEER and ANSYS. Use of online resources in the collaborative design process. Design file transfer protocols. Design project using a technology based team environment. CAD/CAE system selection criteria. (1 hour lecture, 6 hours laboratory). (Same course as Mechanical Engineering 322L)

CPSC 323 Programming Languages and Translation (3 units)

Prerequisites: EPP or CPSC-301.

Basic concepts of programming languages and principles of translation. Topics include history of programming languages, various programming paradigms, language design issues and criteria, development of practical translators for modern programming languages.

CPSC 332 File Structures and Database Systems (3 units)

Prerequisites: CPSC 131.

Fundamental theories and design of database systems, the Structural Query Language (SQL), and basic concepts and techniques of data organization in secondary storage. Topics include introduction to database systems, ER model, relational model, index structures, and hashing techniques.

CPSC 335 Problem Solving Strategies (3 units)

Prerequisites: EPP or CPSC-301, Math 270B, and Math 338.

Complexity classes, including undecidable and NP-complete problems. Problem solving strategies applied to parallel and distributed processing, numerical computation, and artificial intelligence. Greedy methods, divide-and-conquer, dynamic programming, approximation, and search methods.

CPSC 351 Operating Systems Concepts (3 units)

Corequisite: EPP or CPSC-301.

Resource management, memory organization, input/output, control, process synchronization and other concepts as related to the objectives of multi-user operating systems.

CPSC 362 Foundations of Software Engineering (3 units)

Prerequisites: EPP or CPSC-301, and CPSC 311.

Basic concepts, principles, methods, techniques and practices of software engineering. All aspects of software engineering fields will be covered briefly. Computer-Aided Software Engineering (CASE) tools are used.

CPSC 376 Client / Server Systems with Java (3 units)

Prerequisites: CPSC 223J and CPSC 351.

Concepts and architecture of client-server systems using Java. The course covers the techniques for building client-server systems, multi-threading, and network programming.

CPSC 386 Introduction to Game Design & Production (3 units)

Prerequisites: CPSC 131.

Current and future technologies and market trend in game design and production. Game technologies, basic tools for building games, and the process of game design, development, and production.

CPSC 431 Database and Applications (3 units)

Prerequisite: CPSC 332, and EPP or CPSC-301.

Database design and application, database programming using SQL and other languages, query optimization. transaction management.

CPSC 433 Data Security and Encryption Techniques (3 units)

Prerequisites: CPSC 311, CPSC 351, and MATH 270B.

System security and encryption. Current issues in security, encryption and privacy of computer based systems.

CPSC 440 Computer System Architecture (3 units)

Prerequisites: CPSC 240.

Computer performance, price/performance, instruction set design and examples. Processor design, pipelining, memory hierarchy design, and input/output subsystems.

CPSC 451 Advanced Operating Systems (3 units)

Prerequisite: CPSC 351.

The course covers internal structures of a modern operating system. The specific topics include processes, process communication, file systems, networking, and the I/O system. There are several programming assignments which will use system calls and other low level interfaces.

CPSC 459 Micro-Computer Software Systems (3 units)

Prerequisite: CPSC 351.

The design and implementation of software. Analysis of a micro-computer operating system and work on a team to implement a significant programming assignment.

CPSC 462 Software Design (3 units)

Prerequisites: CPSC 362.

Basic concepts of software modeling, software process and some tools. Object-oriented analysis and design and Unified Process will be covered. Some computer-aided software engineering (CASE) tools will be recommended to use for doing homework assignments.

CPSC 463 Software Testing (3 units)

Prerequisites: CPSC 362.

Software testing techniques, reporting problems effectively and planning testing projects. Students apply what they learned, throughout the course, to a sample application that is either commercially available or under development.

CPSC 464 Software Architecture (3 units)

Prerequisites: CPSC 362.

Basic principles and practices of software design and architecture. High-level design, software architecture, documenting software architecture, software architecture evaluation, software product lines, and some considerations beyond software architecture.

CPSC 466 Software Process (3 units)

Prerequisites: CPSC 362.

Practical guidance for improving the software development and maintenance process. Students will learn how to establish, maintain, and improve software processes. They will also be exposed to some common process models, such as CMM, CMMI, PSP, and TSP.

CPSC 471 Computer Communications (3 units)

Prerequisite: CPSC 351.

Digital data communications. Terminology, networks and their components, common-carrier services, telecommunication facilities, terminals, error control, multiplexing and concentration techniques.

CPSC 473 Web Programming and Data Management (3 units)

Prerequisite: CPSC 332

Various techniques for developing Web-based database applications using software engineering methodology. Introduce concept and architecture of Web servers, Web database design techniques, client/server side programming, and Web application tools and techniques.

CPSC 474 Distributed Computing using Web Service and .NET Remoting (3 units)

Prerequisites: CPSC 473.

Concepts of distributed computing and Web services, the applications of XML and Web services, distributed applications development techniques with Web services and .NET Remoting.

CPSC 476 Java Enterprise Application Development (3 units)

Prerequisites: CPSC 223J and 351.

Concepts and architecture of the J2EE platform, component technologies, platform roles, platform services, services technologies, communication technologies, Enterprise Java Beans (EJBs), and Java enterprise application development using Web logic or Web sphere.

CPSC 481 Artificial Intelligence (3 units)

Prerequisite: CPSC 335.

Use of computers to simulate human intelligence. Topics include production systems, pattern recognition, problem solving, searching game trees, knowledge representation, and logical reasoning. Programming in AI environments.

CPSC 483 Data Mining and Pattern Recognition (3 units)

Prerequisites: CPSC 332

Classification techniques, discriminant functions, training algorithms, potential function theory, supervised and unsupervised learning, feature selection, clustering techniques, multidimensional rotations and rank ordering relations.

CPSC 484 Principles of Computer Graphics (3 units)

Prerequisite: EPP, Math 270B, and Math 150B.

Examination and analysis of computer graphics; software structures, display processor organization, graphical input/output devices, display files. Algorithmic techniques for clipping, windowing, character generation and viewpoint transformation.

CPSC 485 Computational Bioinformatics (3 units)

Prerequisite: Upper division standing, BIOL 101, and CPSC 131 or consent of instructor.

Algorithmic approaches to biological problems. Motif finding, genome rearrangement, DNA sequence comparison, sequence alignment, DNA sequence, repeat finding, and gene expression analysis.

CPSC 486 Game Programming (3 units)

Prerequisites: CPSC 386.

Corequisite: CPSC 484.

Principles of game programming (2D game development techniques) and multimedia entertainment techniques (sound, animation, and so forth).

CPSC 487 Advanced Game Programming (3 units)

Prerequisites: CPSC 486.

Advanced game programming techniques, building on the principles and techniques covered by CPSC 486 Game Programming. 3D game development, real-time rendering, physics simulation.

CPSC 489 Game Development Project (3 units)

Prerequisites: CPSC 487

Corequisite: CPSC 481.

Individual or team development of realistic games based on the theories and techniques of prior courses. Regular presentation and demonstration of work in progress is required.

CPSC 491T Variable Topics in Computer Science (1-3 units)

Prerequisites: Junior/Senior standing and consent of the instructor.

Lectures and/or workshops covering various current Computer Science topics. Course may be repeated for up to 3 units. Course topics maybe taken only once.

CPSC 495 Internship in Computer Science (1 - 3 units)

Prerequisite: Computer Science or related major, and consent of instructor.

Practical experience relevant to computer science in industry or government organizations. Written and oral reports are required.

CPSC 499 Independent Study (1 - 3 units)

Prerequisite: Approval by the Computer Science Chair.

Special topic in Computer Science selected in consultation with and completed under the supervision of instructor.

Related Courses for Computer Science Majors

The following are current descriptions of related field courses mentioned in this handbook:

BIOL 101 Elements of Biology (3 units)

Underlying principles governing life forms, processes and interactions. Elements of biology and reasoning skills for understanding scientific issues on personal, societal, and global levels. For the non-science major. No credit toward biological science major. (3 hours lecture)

BIOL 101L Elements of Biology Laboratory (1)

Prerequisite or corequisite: Biol 101.

Laboratory experiments demonstrating the principles presented in the lecture course. Scientific inquiry, cell structures and function, physiology, genetics, biodiversity, evolution and ecology. For non-science major. (3 hour laboratory or fieldwork: weekend field trips may be required).

CHEM 120A General Chemistry (5 units)

Prerequisites: Passing score on the Chemistry Placement Examination and exemption from or passage of ELM examination or completion of CHEM 115 with a grade of C or better. For majors and minors in the physical and biological sciences.

The principles of chemistry: stoichiometry, acids, bases, redox reactions, gas laws, solid and liquid states, changes of state, modern atomic concepts, periodicity and chemical bonding.

Laboratory: elementary physical chemistry and volumetric quantitative analysis (3 hours lecture, 6 hours laboratory)

CHEM 125 General Chemistry for Engineers (3 units)

Prerequisites: CHEM 120A.

Chemical thermodynamics, chemical equilibrium (gaseous, aqueous, acid-base, solubility and complexation), elementary electrochemistry and chemical kinetics.

GEOL 101 Physical Geology (3 units)

Prerequisites: High school chemistry or physics or equivalent.

The physical nature of the planet earth, the genesis of rocks and minerals, erosion processes and their effects.

GEOL 101L Physical Geology Lab (1 unit)

Corequisite: GEOL 101.

Laboratory on minerals, rocks, earthquakes, and map and aerial photographic interpretation. (3 hours laboratory or field trip)

GEOL 201 Earth History (3 units)

Prerequisite: GEOL 101, 101L.

Evolution of the earth as interpreted from rocks, fossils and geologic structures. Plate tectonics provides a unifying theme for consideration of mountain building, evolution of life and ancient environments. (3 hours lecture)

GEOL 201L Earth History Lab (1 unit)

Prerequisite: GEOL 101, 101L.

Evolution of the earth as interpreted from rocks, fossils and geologic structures. Plate tectonics provides a unifying theme for consideration of mountain building, evolution of life and ancient environments. (3 hours laboratory, field trips)

MATH 150A, B Calculus (4, 4 units)

Prerequisites: four years of high school mathematics including geometry, two years of college algebra and trigonometry; a passing score on the ELM (Entry Level Mathematics Exam) or exemption; and a passing score on the MQE (Mathematics Qualifying Exam) or exemption. Math 125, with a grade of C (2.0) or better, is an MQE exemption. MATH 150A or equivalent is the prerequisite for MATH 150B.

Analytic geometry and properties of functions. The limit, differential, and definite integral concepts; applications of the derivative, techniques and applications of integration; Taylor polynomials and series. Introduction to differential equations.

MATH 250A Multivariate Calculus (4 units)

Prerequisites: MATH 150A, B or equivalent.

A continuation of MATH 150. Infinite series, Taylor's theorem, functions of several variables, partial differentiation, multiple integration.

MATH 250B Introduction to Linear Algebra & Differential Equations (4 units)

Prerequisite: MATH 250A.

An introduction to the solutions of ordinary differential equations and their relationship to linear algebra. Topics include matrix algebra, systems of linear equations, vector space, linear independence, linear transformations and Eigen values.

MATH 270A Mathematical Structures I (3 units)

Prerequisite: Four years high school mathematics.

First of two semesters of fundamental discrete mathematical concepts and techniques needed in computer-related disciplines. Logic, truth tables, elementary set theory, proof techniques, and combinatorics.

MATH 270B Mathematical Structures II (3 units)

Prerequisite: MATH 270A.

Second of two semesters of fundamental discrete mathematical concepts and techniques needed in computer-related disciplines. Graph theory, Boolean algebra, algebraic structures, linear algebra.

MATH 338 Statistics Applied to Natural Sciences (4 units)

Prerequisite: MATH 130 or MATH 150B or consent of Instructor.

An introduction to the theory of statistics and statistical applications with an emphasis on data analysis techniques. Topics include elementary probability theory, estimation, hypothesis testing, correlation and regression, analysis of variance, and non-parametric tests. (3 hour lecture and 2 hour laboratory)

MATH 340 Numerical Analysis (3 units)

Prerequisites: MATH 250B, and either EGGN 205, CPSC 121 or equivalent.

Approximate numerical solutions of systems of linear and nonlinear equations, interpolation theory, numerical differentiation and integration, numerical solution of ordinary differential equations. Computer coding of numerical methods.

MATH 370 Mathematical Model Building (3 units)

Prerequisite: MATH 250B, or consent of instructor and one of the following: EGGN 205, CPSC 121 or equivalent.

The theory of mathematical models and their applications in the biological, physical and social sciences. Discrete and continuous models.

PHYS 225 Fundamental Physics: Mechanics (3 units)

Prerequisite: MATH 150A. Concurrent enrollment in Physics 225L required.

Classical Newtonian mechanics; linear and circular motion; energy; linear/angular momentum; systems of particles; rigid body motion; wave motion and sound. (3 hours lecture)

PHYS 226 Fundamental Physics: Electricity and Magnetism (3 units)

Prerequisite: MATH 150B and PHYS 225 or equivalent; concurrent enrollment in PHYS 226L required.

Electrostatics, electric potential, capacitance, dielectrics, electrical circuits, resistance, EMF, electromagnetic induction, magnetism and magnetic materials, and introduction to Maxwell's equations. (3 hours lecture)

PHYS 225L, 226L Fundamental Physics Laboratory (1,1 unit)

Concurrent enrollment in the corresponding PHYS 225, 226 lecture required (3 hours laboratory). (Instructional fee required)

Appendix A. Progress Check Sheet

Major Progress Check Sheet 2008

COURSE	REQUIRED	UNITS	SEMESTER	GRADE	REMARK
CPSC 120	All	3			
CPSC 121	All	3			
CPSC 131	All	3			
CPSC 223	All	3			
CPSC 240	All	3			
CPSC 254	All	3			
EPP (CPSC 301)	All	CR			
CPSC 311	All	3			
CPSC 315	All	1			
CPSC 323	All	3			
CPSC 332	All	3			
CPSC 335	All	3			
CPSC 351	All	3			
CPSC 362	All	3			
CPSC 440	All	3			
CPSC 471	All	3			
CPSC 481	All	3			
Biol 101	All	3			
Biol 101L	All	1			
Eng 101	All	3			
Chem	All	8			
Geology					
Physics					
Math 150A	All	4			
Math 150B	All	4			
Math 270A	All	3			
Math 270B	All	3			
Math 338	All	4			
CPSC 386	MG	3			
CPSC 484	MG	3			
CPSC 486	MG	3			
CPSC 487	MG	3			
CPSC 489	MG	3			
CPSC 431	IE	3			
CPSC 473	IE	3			
CPSC 474	IE	3			
CPSC 476	IE	3			
CPSC 300/400	IE	3			
CPSC 462	SE	3			
CPSC 463	SE	3			
CPSC 464	SE	3			
CPSC 466	SE	3			
CPSC 300/400	SE	3			
CPSC 400	SC	3			
Math 250A	SC	3			
Math 250B	SC	3			
Math 340	SC	3			
Math 370	SC	3			
CPSC 300/400	CT	3			
CPSC 300/400	CT	3			
CPSC 400	CT	3			
CPSC 400	CT	3			
CPSC 400	CT	3			

For up-to-date information on equivalent courses, please visit <http://www.assist.org>.