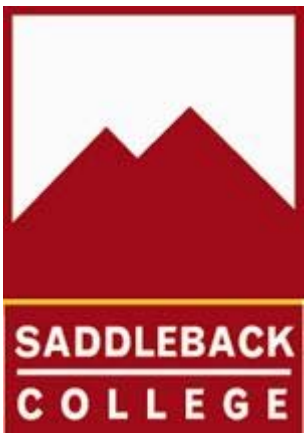
Saddleback College
Program Review for
Computer Science



Submitted on October 19, 2005

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Program Review Team Members and Approvals

Program Review Team Chair:

Christina Carroll

Program Review Team Members:

Peggy Watkins

Ray Watkins

Dr. James Wright

Approvals:

_____
Division Dean

_____
Program Review Chair

_____
Academic Senate President

_____
Vice President of Instruction

Program Review Checklist

Date Completed	Action
	Contact Program Review Chair for orientation
	Form Program Review Team
	Gather documents (Org Chart/Staffing Profile/SLO Assessment Forms/Data Sets)
	Solicit input from faculty and students
	Determine if additional research is needed
	Contact College Research Analyst if necessary
	Write Program Review report
	Submit report to Dean and Program Review Chair for approval
	Report submitted to Academic Senate for approval
	Report submitted to Office of Instruction for approval
	Report submitted to College President and the Office of Institutional Effectiveness
	Report posted to the IE web site
	Open, formal presentation to the Program Review Committee and other interested parties

Section I: Program Overview

The mission of the South Orange County Community College District requires a systematic review of the Computer Science Program to ensure quality and relevance, and the effective use of resources. This program review is used for making judgments about the effectiveness of the program and to improve student learning. It is a means of ensuring that the Computer Science Program is effective and responsive to the local college community.

The results of the Computer Science Program review will be incorporated into the strategic planning process. This program review will also support the WASC accreditation standards, interface with the college Enrollment Management Plan and most importantly, provide information for program planning and improvement.

This document begins with an overview of the Computer Science program. The overview covers the mission and goals of Saddleback College, the Mathematics, Science and Engineering Division, and the Computer Science department. It describes the historical background and unique characteristics of the Computer Science program, and its current strengths, opportunities and challenges.

The main document reviews the current infrastructure of the Computer Science department, including faculty and staff, curriculum, facilities, and resources, as well as current levels of student success.

The document also includes a needs assessment in the areas of staffing, curriculum, research, equipment, facilities and outreach.

A. The Mission of the Program and its Link to the College's Mission and Goals

A.1 College Mission and Goals

A.1.1 Mission Statement

To provide access to learning opportunities that promote student success; to foster intellectual growth, individual expression, and character development; and support a dynamic environment of innovation and collegiality.

A.1.2 Goals

The primary goal of Saddleback College is to provide a comprehensive post secondary education and a full range of student services. Emphasis is placed on open access to all students, including a changing and diverse student population. Academic success and student achievement are joint responsibilities of the students, the staff, and the college. To this end, the college will:

A.1.2.1 Provide educational programs leading to the Associate in Arts and Associate in Science Degrees.
A.1.2.2. Provide a comprehensive, broad range of high quality courses and programs to enable students to pursue their educational objectives and career goals.
A.1.2.3. Provide a meaningful general education program including baccalaureate-level transfer and occupational curricula.
A.1.2.4. Provide necessary developmental, remedial, and basic skills instruction so that students may be successful in their chosen course of study.
A.1.2.5. Provide access for the community to the educational, cultural, and recreational resources of the college.
A.1.2.6. Provide counseling and other support services which are responsive to the needs of students.
A.1.2.7. Provide opportunities in continuing education and community services, including courses for skill upgrading, retraining for professionals, and life long learning for older adults.

A.2 Math, Science, and Engineering Division Goals

To instruct and inspire all students in rigorous, high quality post-secondary education in lower division courses in mathematics, science and engineering with a vision for tomorrow.

A.2.1 Review and revise, as necessary, the division Mission Statement.
A.2.2 Facilitate and implement retention and enrollment management with a focus on outreach, student success, access, increased productivity, growth, higher WSCH/FTEF and sound course management.
A.2.3 Increase student enrollment and retention in distance education classes, including classes offered in a hybrid instructional mode where appropriate.
A.2.4 Initiate program review per established process, instrument(s) and timeline with a focus on improving student learning outcomes, persistence, retention and student success.
A.2.5 Increase student transfer rate.
A.2.6 Provide division resources for the completion and submission of the accreditation self-study.

A.2.7 Improve internal and external communication.
A.2.8 Recommend, monitor and complete new construction and renovation of college facilities per the Five-Year Facilities and Master Plan including a new Science-Math Building.
A.2.9 Participate in needs assessments and discussions of programs, services and uses for new educational sites.
A.2.10 Provide increased administrative, technological and maintenance support and services to students and the departments by prioritizing expenditures.
A.2.11 Improve respect, consideration of and sensitivity for diverse groups and perspectives.
A.2.12 Manage and maintain board-approved budget to reach division and college goals.

A.3 Computer Science Program Mission and Goals

A.3.1 Mission Statement

Our mission is to provide classes that allow students to bring their basic computer skills to the level required for the Associate Degree and/or transfer; to provide classes that give students the problem-solving and programming skills necessary for upper-division work in Computer Science and related fields.

A.3.2 Goals

A.3.2.1 To provide quality lower-division lecture/laboratory courses for transfer students in Computer Science. Related to College goals A.1.2.1, A.1.2.2, A.1.2.7.
A.3.2 .2 To provide quality lower-division lecture/laboratory Computer Science courses for majors programs and transfer students in Anthropology, Business Administration, Economics, Engineering, Mathematics, Physical Therapy, Political Science, and Sociology. Related to College goals A.1.2.1, A.1.2.2, A.1.2.7.
A.3.2.3 To provide general education courses in computer science for students of all majors. We offer an introductory Computer Science 1A class that can be taken by any student; the course has no prerequisite requirements. Related to College goals A.1.2.1, A.1.2.2, A.1.2.3, A.1.2.7.
A.3.2.4 To increase student retention rates and transfer rates to universities by offering quality instruction within a diverse schedule. Related to College goals A.1.2.1, A.1.2.2, A.1.2.3, A.1.2.5, A.1.2.7.

B. Historical Background and Unique Characteristics of the Program

B.1 Historical Background

The first Computer Science classes were offered as Mathematics classes (in the Mathematics department) in the mid-1970's. As interest in Computer Science grew, it was split off as a separate department in 1977. A small mini-computer, whose operating system was developed by former Saddleback students, served the first classes. Expansion of the course offerings was made possible by connecting to a north Orange county campus via a remote job entry card reader, which was replaced in 1980 by a more powerful mini-computer. With the rise in popularity and use of personal computers, and therefore the availability of more software, in the late 1980's the Computer Science program began to use stand-alone personal computers (both IBM and Macintosh) in the computer lab. By the late 1990's a small local network had been developed, which became part of the district network in 2003.

B.2 Unique Characteristics

The Saddleback College Computer Science program is structured after programs offered at universities and 4 year colleges (i.e. University of California (UC) and California State Universities (CSU)). A majority of our students transfer to the UC or California State University systems. The curriculum of the Computer Science program must be compatible with programs offered at these institutions. However, unlike the courses offered at major universities and some other local 2-year colleges, Saddleback College offers small class sizes. For example, many of the Computer Science courses offered at the UC and CSU campuses (particularly at the introductory level) are large lecture classes, with several smaller study and/or computer laboratory sections. The lecture sections, which can have up to 200 students, are taught by professors. In many cases, the study and laboratory sections are administered by graduate students. At Saddleback College, we offer small lecture sections. Our maximum enrollment is 40 students per section. Furthermore, accredited instructors teach the lecture portion of the course and are instructors of record in the computer laboratory. The smaller class sizes allow the faculty members to focus on the individual learning objectives and progress of the students. Many of our transfer students praise the quality of education they received at Saddleback.

The Computer Science program has state-of-the-art computer equipment available in both the classrooms for demonstration by the instructor and in the computer laboratory for use by the students.

In Fall semester, 2004 the Computer Science Society was developed by a now former student to encourage learning and fellowship outside the

classroom. Unfortunately, when this student transferred to UC Irvine the club lost its guiding force. If the department ever gets the instructional support that it has requested for many years, a Computer Science club will be the responsibility of this instructional assistant.

C. Progress Since the Last Program Review

This is the first formalized Program Review in which the Computer Science Department has participated

D. Current Strengths, Opportunities, and Challenges

D.1 Current Strengths

The Computer Science program is rigorous and demanding. Students who complete the program are well qualified to transfer to a four-year college or university. Anecdotal reports from students who have transferred reaffirm the strength of their grounding in lower division Computer Science coursework. This has also been reflected in many studies (particularly from the University of California, Irvine) that show transfer students from Saddleback College performing at a higher level than native UC Computer Science students.

The Computer Science department is fortunate to have two excellent and dedicated full-time instructors, supported by a full-time instructor from the Mathematics department who also teaches Computer Science classes, and a group of six talented part-time instructors from industry.

D.2 Current Opportunities

Constant advances in technology make the field of Computer Science ever-changing. The opportunities for learning new skills and knowledge, and sharing them with students provide ongoing gratification and challenge.

D.3 Current Challenges

The most important challenge the Computer Science department faces at this time is to change the perception that there are no programming jobs available for graduating students. Publicity regarding the number of jobs being outsourced to other countries, combined with the end of the dotcom boom, has created concerns about instability in the technology job market. In fact, there are too few Computer Science graduates to fill available jobs.

In July of 2005, Bill Gates of Microsoft gave a speech in which he said that Microsoft is not able to hire enough computer scientists in the U.S. to fill

its available positions. He also said that Computer Science education is flourishing in India and China, and the U.S. risks falling behind these countries in innovation. The number of jobs available is growing, but this trend is not covered by the national media.

Section II: Review Report

A. Faculty and Staff

A.1 Faculty

At this moment in time the Computer Science department has an adequate number of full-time instructors to support the number of classes we currently offer. There is one Computer Science faculty member full-time in the classroom, the same faculty member in the Learning Center for overload, one Computer Science faculty member full-time in the Learning Center, one full-time Mathematics faculty member teaching a Computer Science class (overload) and also working in the Learning Center for overload, and seven part-time instructors divided between the classroom and the Learning Center.

In terms of classes taught rather than number of instructors, the full-time to part-time ratio in the classroom is almost even, including full-time overload. The ratio of full-time to part-time plus full-time overload is approximately 2:3. In the Learning Center the ratio of full-time to part-time instructors is 3:1. Several hours in the Learning Center are covered by full-time faculty working overload. If the full-time overload is combined with the part-time hours, the ratio is 5:4.

The department is very fortunate to have a group of part-time instructors, most of whom are professionals working in the Computer Science field, who bring a great deal of talent and enthusiasm to the classroom and Learning Center. But one is moving out of state, and another has just retired. It will be necessary to hire more part-time faculty next semester.

The most compelling factor in the review of faculty needs is the fact that both full-time Computer Science instructors and the one full-time Mathematics instructor who teaches in the program are planning to retire at the end of spring semester, 2007. Because the program is small, it would barely support another full-time faculty member now, but it will be necessary to start the hiring process prior to the retirement of the entire full-time staff.

A.2 Staff

The Computer Science Learning Center depends on the skill of our liaison to the Innovation and Technology Center (ITC), Michael Estes. His knowledge and expertise are invaluable. With his help, the full-time Learning Center instructor is able to provide everything our classes need in the computer lab.

Although the Computer Science department does not have any regular instructional support staff, it is lucky to have enthusiastic student help

(students in the Computer Science program) for a few hours per week. We are also very grateful for the help of the already over-burdened division staff. There is a critical need for a third classified position in the division office.

The department has requested an instructional assistant for many years. The college has approved the request, but funding has not been available. The primary responsibility of the full-time faculty member in the Learning Center (and who is also the network administrator) is to work with students in the lab. The department needs an instructional assistant who can wear many hats – work with students, provide clerical assistance, maintain equipment, and perform custodial tasks. At this time these jobs are done by the Learning Center faculty member, with a little assistance from student help. Since student help is scheduled at the busiest times in the Learning Center, general cleaning and maintenance cannot be done at those times.

B. Curriculum and Instruction

B.1 Curriculum

Our courses foster intellectual growth (the Saddleback College mission) and " provide a comprehensive, broad range of high quality courses and programs to enable students to pursue their educational objectives and career goals." (A.1.2.2) The educational path of students taking courses in the Computer Science department may lead to an Associate in Arts (AA) or an Associate in Science (AS) degree, to transfer to a four-year college or university, or to an upgrade of programming skills for working professionals.

The Computer Science curriculum is entirely driven by the Computer Science curriculum at the four-year colleges and universities to which our students transfer. The faculty and chair of the Computer Science department review the programs at the CSU and UC Universities every year. In addition, the chair is in contact from time to time with the chairs of various related schools at UCLA, UCI, CSU Fullerton, CSU Northridge, CSU Long Beach, UC San Diego and CSU San Diego. The department chair also works closely with the Saddleback College counselors when necessary. The Computer Science courses have been articulated with all the UC and CSU campuses.

The contents of each course are evaluated every five years and on an as needed basis. The curriculum is revised and sent to the Curriculum Committee for approval. Table B.1.1 summarizes when each course was last reviewed.

Table B.1.1: Computer Science Department Curriculum Updates

Course	Name	State Approval	Last Update
CS 1A	Introduction to Computer Science	04/10/1989	09/02/2003
CS 1B	Introduction to Programming	04/10/1989	09/02/2003
CS 1C	Advanced Program	02/22/1993	09/02/2003
CS 2B	Data Structures	02/03/1992	09/02/2003
CS 3A	Computer Organization and Machine Language	02/03/1992	04/30/2003
CS 3B	Computer Organization and Assembly Language	02/03/1992	09/02/2003
CS 4A	Introduction to Java for Computer Science	02/26/2001	09/02/2003
CS 4B	Advanced Topics in Java for Computer Science	02/26/2001	09/02/2003

Over the past five years, the Computer Science course outlines were updated to reflect the Title V guidelines. Further changes to curriculum will be made in response to changes in the Computer Science programs of four-year colleges and universities.

Since Computer Science is a specialized technical field, it does not fall under the IGETC general education requirements. The Associate degree program requires CS 1A, CS 1B, CS 1C, CS 2B, CS 3A, CS 3B, Math 3A, and Math 3B. CS 4A and CS 4B are strongly recommended.

Because our student population consists of both transfer students and those working in industry who wish to update their skills, it is not possible to enforce prerequisites. We instead specify recommended preparation for our classes. The Computer Science curriculum changes so frequently that courses taken five years ago may no longer be offered. Skills learned in the workplace may have provided the necessary preparation. In all classes except CS 1A faculty members usually give a quiz on the first day of class that covers basic concepts the students need in order to succeed in the class. The recommended preparation for the Computer Science courses are summarized in Table B.1.2.

Table B.1.2: Computer Science Courses Recommended Preparation

Course	Name	Recommended Preparation
CS 1A	Introduction to Computer Science	None
CS 1B	Introduction to Programming	CS 1A
CS 1C	Advanced Program	CS 1B
CS 2B	Data Structures	CS 1B and CS 1C
CS 3A	Computer Organization and Machine Language	One programming course and Math 253
CS 3B	Computer Organization and Assembly Language	CS 3A
CS 4A	Introduction to Java for Computer Science	CS 1B
CS 4B	Advanced Topics in Java for Computer Science	CS 4A

Until Fall of 2004 all Computer Science classes had a corequisite of two three-hour Learning Center labs for which the student registered separately. These labs were required for articulation with the UC and CSU campuses to which our students transfer. Without consultation with the department, but with the approval of the division dean, the Curriculum Committee removed the corequisite labs and made the labs part of the class. This has created a scheduling nightmare for the division office staff, and a great deal of confusion for our students. This change is currently being reassessed. (See Section B.2.2 ahead)

B.2 Instruction

B.2.1 Classroom Instruction

Learning goals and objectives are documented in the course curriculum. In addition, each instructor lists learning objectives and goals in the course syllabus handed out the first day of class. A variety of assessment methods and instruments are used to measure student progress. They include programming assignments, other assignments, quizzes, tests, and student presentations.

The learning objectives are reevaluated each time the department faculty review the individual courses. The Computer Science department developed Student Learning Outcomes (SLOs) this semester, Fall of 2005, and will use them in the future to evaluate the efficacy of our curriculum and instruction. See the discussion in Section C, Student Success.

The Computer Science faculty (both full-time and part-time) strive to maintain the integrity of Saddleback College academic standards and ensure consistency of instruction in all the courses offered. More than half of the courses are offered in only one section, but in multiple-section classes the faculty use the same textbook and the same or similar assessment tools.

To make the program more effective, faculty members constantly experiment with new and innovative presentation techniques, and evaluate their effect. New teaching methods are discussed at the department meetings and in casual conversations between faculty members.

As new technologies become available, they are used in the Computer Science classrooms. One of our classrooms is equipped with a computer and an overhead projector. A VCR can be ordered from the Audio-Visual department. The computer can be used to display PowerPoint presentations, demonstrate program execution, access material on the instructor's website, and display information from other internet sites.

The Computer Science department has its own website at http://cs.saddleback.edu. Both Computer Science faculty and some Mathematics faculty keep updated course materials and examples on this website, as well as some assignments and practice tests. This website was developed by Ray Watkins, a full-time Mathematics faculty member who has also been instrumental in developing several Computer Science classes. One part-time faculty member has his own website, which is used for the classes he teaches.

The Computer Science class schedule should be adjusted to maximize enrollment and productivity within the constraints of available faculty. Many of our course offerings are single-section classes, and those are offered in the evening. If it is necessary to cancel classes so that only one section remains, that class should also be offered in the evening. The enrollment in Computer Science classes has always been cyclical, making it difficult to schedule efficiently. The fact that we are currently in the down part of the cycle is shown by Table B.2.1.1.

Table B.2.1.1: Access and Productivity (Fall and Spring Semesters Combined)

	2000/2001	2001/2002	2002/2003	2003/2004	2004/2005	Change
Sections Offered	28	28	27	25	25	-10.71%
C1 Duplicated Head Count	834	843	750	584	507	-39.21%
Average Enrollment Per Section	29.79	30.11	27.78	23.36	20.28	-31.91%

The dramatic decrease in the number of students between 2000/2001 and 2004/2005 requires a closer look. The following tables look at the breakdown of this information first by semester, and then by classes.

Table B.2.1.1: Access and Productivity (Fall Semesters Only)

	Fall 2000	Fall 2001	Fall 2002	Fall 2003	Fall 2004	Change
Sections Offered	13	14	14	13	13	0.00%
C1 Duplicated Head Count	403	446	403	341	336	-16.63%
Average Enrollment Per Section	31.00	31.86	28.79	26.23	25.85	-16.63%

Table B.2.1.2: Access and Productivity (Spring Semesters Only)

	Spring 2001	Spring 2002	Spring 2003	Spring 2004	Spring 2005	Change
Sections Offered	15	14	13	12	12	-20.00%
C1 Duplicated Head Count	431	397	347	243	223	-48.26%
Average Enrollment Per Section	28.73	28.36	26.69	20.25	18.58	-35.32%

The decrease in enrollment in the tables above, while dramatic, are mirrored in Computer Science programs across the nation, from community colleges like Saddleback to four-year institutions like Carnegie Mellon and the Massachusetts Institute of Technology.

The breakdown by semester seems to indicate that even though the number of sections offered has been reduced, there are still too many classes being offered during Spring semester. Fall semester classes

should also be looked at closely. These tables are broken down by classes in the Table B.2.1.3 below.

Table B.2.1.3: Access and Productivity by Class

Decrease in Enrollment from 2001 to 2004			
Course	Fall	Spring	Summer
CS 1A	-29.00%	-54.00%	-17.00%
CS 1B	-41.00%	-32.00%	-58.00%
CS 1C	-54.00%	-57.00%	
CS 2B	-7.00%	-41.00%	
CS 3A	-33.00%	-33.00%	
CS 3B	-7.00%	+5.00%	
CS 4A	-40.00%		
CS 4B		-27.00%	

The numbers above are distorted by the fact that many of our classes are single-section. However, they are a good resource for input into scheduling decisions. Our students seem to prefer taking CS 1A in the Fall semester, making fewer sections needed in the Spring semester. The demand for CS 1B in the Summer semester has dropped off. CS 2B, CS 3A and CS 3B will be offered only once a year, which should improve enrollment.

We expect that enrollment will increase over the next two years as students understand that there ARE well-paying jobs available for good programmers. The department must also consider the reality that if the Computer Science department at Saddleback College does not offer courses at attractive times, students will simply take those classes at other local community colleges. Once we lose a student, that student usually does not return.

B.2.2 Learning Center Instruction

The Computer Science Learning Center is the computer lab used by all Computer Science classes and three Mathematics classes (Math 3A, Math 9, and Math 10) that have a lab component. The Learning Center is designed to support and enhance the students' classroom experience. There is a Computer Science faculty member in the lab at all times, and there is student help available several hours a week. One faculty member who is assigned to the lab is also responsible for the administration of the network (a part of the larger college and district

network) that includes the sixty computers in the lab and several computers in faculty offices.

The Learning Center is a drop-in lab which is open for fifty-four hours per week. Most of the demand occurs Monday through Thursday, with lighter use on Friday and Saturday. The department has maintained the Friday and Saturday hours to accommodate those students who are working during the rest of the week. Students can use the lab at any time convenient to them, with confidence that help will be available to them. Any other student registered at the college can use a computer in the Learning Center as a guest user, but without access to our network resources.

When immediate hands-on experience on the computer will enhance understanding of a concept being taught in the classroom, a Computer Science instructor will often use the computers in the lab for that purpose. To a lesser degree, Mathematics instructors will do the same.

Other departments in the division, particularly Biology and Physics, bring their classes to the Learning Center on an occasional basis, when hands-on use of the computers will allow students to do statistical interpretation of lecture information or test results. Those students are also encouraged to use the lab on a drop-in basis.

Students in Computer Science classes and those Mathematics classes with a lab component pay a lab fee that covers use of the computers and all the printing they need to do for these specific classes. The Computer Science Learning Center is the only computer lab on campus that does not charge students for every page that they print. We have been able to maintain this policy by restricting printing to materials for only those classes that have a lab component. Guest users are welcome to use the computers, but they do not have access to the printers.

Until Fall semester, 2004 students registered for corequisite Learning Center labs when they registered for a Computer Science class or a Mathematics class with a lab component. The learning objectives for these labs were designed to match the learning objectives of the lecture classes, and were measured by the assessment tools of the class. These corequisite labs were determined to be out of compliance with state regulations. When the curriculum was changed in 2004, the lab components were added to the class. This change has generated a cascading series of problems. The time of the lecture class bears no relationship to the time the instructor is actually in the Learning Center. The state still requires that students choose a time or times for the labs,

apart from the time of the class. The instructors who are scheduled in the Learning Center are shown on college records and in the Schedule of Classes as teaching the lecture classes, and also have full online access to the class. (They can add students, drop students, change grades, etc.) And so on. The department is working on a solution to these problems with others affected by this curriculum change. We are urgently requesting a process that separates the labs from the classes, and hope to have a new process in place by Fall semester, 2006.

Because there are no longer any CS 999 labs, the enrollment figures for 2000 through spring of 2004 are not included.

C. Student Success

Transfer to a four-year college or university, with or without an AA or AS degree, is the stated educational goal of slightly more than half of students in Computer Science classes. All students who take classes beyond CS 1A and CS 1B are planning to transfer.

The overall success rate of students in Computer Science courses for the past four years, i.e. those students achieving a grade of A, B, C, or CR, is 63.32%. (Those students whose outcome in a course was unknown have not been factored into this computation.) There is little difference in the success rate for Fall semesters and Spring semesters (63.8% vs. 61.05%). In the Summer semester only CS 1A and CS 1B are offered. Summer students are typically serious and disciplined, and have achieved a success rate of 76.45% since 2001. Table C.1 below shows the success rates of each Computer Science class.

There are many anomalies in the following table, some of which may be explained by a higher than usual percentage of W grades. Most courses have been taught by the same instructors over this time period, so variations in the success rate from semester to semester is not a factor of instructor differences. CS 2B, both in our department and at most four-year schools, is the most difficult course in the Computer Science curriculum and has an expectedly lower success rate. As students proceed through the Computer Science curriculum, those less serious tend to move to other majors and the success rate improves.

Table C.1: Computer Science Courses by Success Rate

	CS 1A	CS 1B	CS 1C	CS 2B	CS 3A	CS 3B	CS 4A	CS 4B
Spring 2001	45.40%	48.90%	53.10%	52.90%		83.30%		
Summer 2001	76.20%	63.90%						
Fall 2001	67.00%	47.60%	51.80%	26.70%	69.80%	73.30%	54.80%	
Spring 2002	47.70%	66.70%	52.50%	44.00%	48.00%	72.40%		73.10%
Summer 2002	73.70%	71.40%						
Fall 2002	62.40%	61.80%	52.30%	31.30%	73.10%	64.30%	73.30%	
Spring 2003	52.60%	46.60%	61.90%	45.00%	70.00%	76.90%		56.50%
Summer 2003	82.90%	76.00%						
Fall 2003	60.00%	47.70%	44.40%	27.80%	88.90%		62.10%	
Spring 2004	59.50%	50.00%	72.00%	70.00%		58.30%		81.80%
Summer 2004	71.40%	60.00%						
Fall 2004	53.10%	53.10%	50.00%	64.30%	62.10%		77.80%	
Spring 2005	56.00%	52.40%	61.90%	65.00%		36.80%		85.70%
Average *	55.20%	60.35%	61.87%	56.03%	71.62%	71.31%	75.00%	93.50%

* The average success rate is computed after removing those students whose outcome in the class is unknown.

The Computer Science program has a higher than average retention rate in its classes. In the time period from Spring semester, 2001 through Spring semester, 2005, retention rates varied from a low of 61.1% to a high of 100%, with an average retention rate of 85.35%. These classes do not have mandatory prerequisites, but rather recommended preparation. At the beginning of each semester instructors counsel students into classes appropriate to their preparation level.

The Computer Science program is largely white and overwhelmingly male. Since 2001 the percentage of male students in the program has climbed from 75% to 86%. This is puzzling (and of concern) to the two full-time members of the department, both of whom are female. Women account for more than half of the students enrolled in both community colleges and four-year institutions, but only 14% of enrollment in Computer Science classes.

In the past four years the ethnic balance of the Computer Science student population has shifted a little. The representation of Hispanic and African American students in the program is close to their representation in the college population. While the percentage of Asian students in the program is twice their percentage in the larger college population, in the year 2000 the percentage was three times higher. Computer Science is still a strong choice for students of Middle Eastern ethnicity, but has become less so for Asian students.

D. Facilities, Technical Infrastructure, and Resources

D.1 Facilities

The Computer Science department currently has one exclusive-use classroom furnished with a computer, imaged to match the computers in the Learning Center, and a projection system. Additional classroom(s) as needed are shared with the Mathematics department. These classrooms do not have projection systems and computers, although both have been requested in the college technology plan for several years.

The Computer Science Learning Center consists of two rooms, one large and one small, with sixty computers for student use. Twenty-four of those computers are in one room, which can be used as a small classroom for demonstrations. This room would be used more effectively if it were bigger, and if it had a projection system. Given the physical limitations of the building, the current lab facilities are adequate. When the new Science building is constructed (a possible five year timeframe), the Learning Center will expand its space.

The office and support space in the Learning Center is a hodgepodge of furniture and equipment. It needs to be redesigned and structured for efficient use. Our current lack of support staff moves this goal into the far future.

D.2 Technical Infrastructure

The computers in the Computer Science Learning Center were installed at the beginning of Fall semester, 2004. They will need to be upgraded in two to three years. The two laserjet printers will also need to be upgraded in the same time period. The goal of the college Technology Plan is to upgrade technological equipment on a reasonable schedule, and it is currently meeting that goal for this department.

The number of computers in the Learning Center is adequate to meet current Computer Science department needs.

D.3 Resources

The resources upon which the Computer Science department depends fall into three categories: instructional assistance, technical assistance and clerical/general support.

The Computer Science curriculum, because it is responsive to changes in technology, constantly changes. This puts enormous pressure on Computer Science faculty. Instructional help is needed within the department

to assist with preparation of materials and grading. Instructional help is also needed in the Learning Center to work directly with students. Student help provide a few hours of assistance, but more is needed.

The ITC provides excellent technical assistance in the person of Michael Estes. His expertise and willingness to work with faculty support the goals of the Learning Center, and therefore the goals of the department.

The department has no clerical or general support. At the present time the full-time Learning Center instructor is responsible for network administration, instructional work with students in the lab, all clerical needs of the Learning Center, and cleaning of furniture and equipment. An instructional assistant for the Learning Center has been approved by the college, but funding is not expected to be available for the foreseeable future.

E. Service, Community Outreach, and Economic Development (optional)

Section III: Needs Assessment

A. Human Resource Needs

The Computer Science department will lose both its full-time faculty members (plus one full-time Mathematics faculty member who teaches one Computer Science class per semester) to retirement at the end of Spring semester, 2007. To ensure continuity of the program, one full-time instructor should be hired for the 2006/2007 academic year. The small number of course offerings will make scheduling three full-time instructors very difficult in the short term, but necessary in the longer term.

An instructional assistant remains a very high hiring priority for the department. We need someone who can work effectively with students, assist in development of materials, and provide support to the Learning Center instructor. We have needed this position for ten years.

There are currently two classified personnel meeting the administrative and secretarial needs of the Astronomy, Biology, Chemistry, Computer Science, Geology, Marine Science, Mathematics, and Physics departments. A 29-hour classified position has recently been approved for the division office, but not yet hired. There is a critical need for a third full-time classified position.

B. Instructional Needs

The Computer Science department faces a difficult challenge in the immediate future. The number of sections offered will have to be reduced in the face of declining enrollments, but the program's foundations must be preserved for inevitable rebound. It will be necessary to schedule single-section classes in the evening, in order to maximize enrollment at the present time.

We know that the curriculum will change – not how it will change, but simply that it will. The field of Computer Science changes every day, and as four-year institutions change their curriculum, the Computer Science department changes its curriculum. There has been a shift in the type of programming done in industry, which will eventually be reflected in the curriculum of the four-year schools. As emerging fields like robotics and information security become more important, they will also become a part of the Computer Science curriculum.

The discussion with district IT and other departments affected by the removal of corequisite labs from Computer Science classes began hopefully early this semester. The discussion has apparently ended. It is absolutely essential that the current method (making two labs a part of each Computer Science class) be modified in order to solve the problems it has generated. There are legal ramifications when the college gives an instructor who is not teaching a class the right to add and drop students or change grades in that class. In

addition, there is no process in place to put the Learning Center instructors into the schedule, either as information for students or data for payroll. Fixing these problems is of highest priority not only for the Computer Science department, but also for the Mathematics, Science and Engineering division.

C. Research Needs

The Data Set produced by the College Research Analyst for this program review contained valuable information. The Computer Science department will request additional data from the College Research Analyst as needed.

It will be necessary to continue to track enrollment trends in Computer Science in order to estimate future enrollments and schedule accordingly.

D. Technical, Equipment and Other Resource Needs

The computers and printers in the Computer Science Learning Center will need to be upgraded within two to three years so that we can continue to provide state-of-the-art equipment to our students. This allows the program to use current software in instruction.

It is critical that computers and projection systems be installed in the classrooms S/M 302, 303, and 304.

The office area in the Learning Center should be redesigned and unneeded furniture and equipment removed. No new furniture or equipment will be needed.

When the new Science building is constructed, the Computer Science department will be assigned more space in the Science/Math building. At that time, which will not occur before the next program review, renovations and additional lab equipment will be required.

E. Facilities Needs

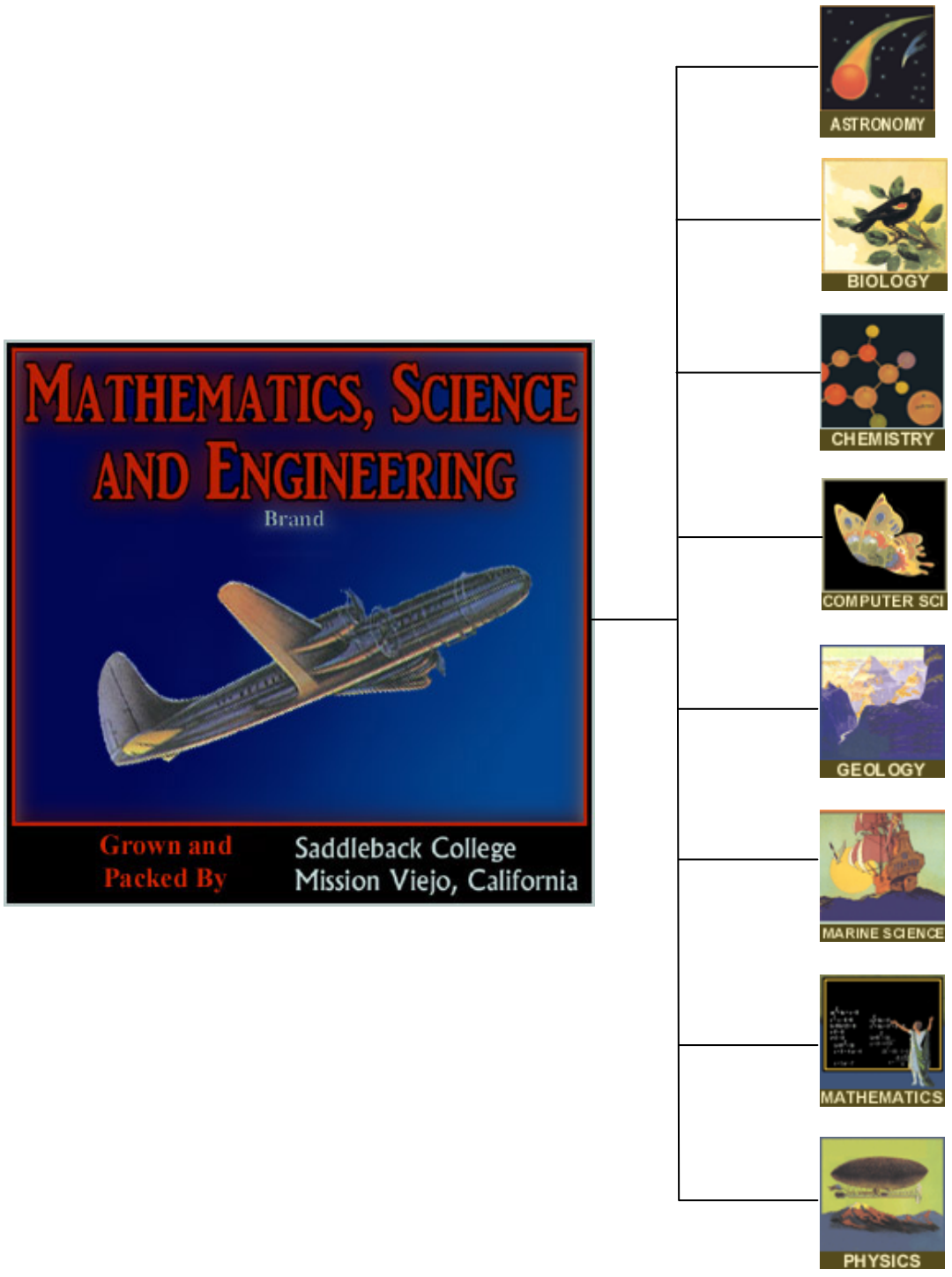
The current facilities are adequate to meet the needs of the Computer Science department at this time.

F. Marketing and Outreach Needs

To combat decreasing enrollment in Computer Science programs nationwide, many four-year colleges and universities are concentrating on marketing the program. The Computer Science department at Saddleback College should consider options such as pursuing grant money to expand student recruiting.

Section IV: Appendices

A. Program Organizational Chart



B. Five-Year Program Staffing Profile

Staffing for Computer Science classes:

Position	Staffing Levels for Each of the Previous Five Years					% Change from Year 1 to Year 5	
	2001	2002	2003	2004	2005		
Administration							
Classified Staff FT							
Classified Staff PT							
Faculty FT	2	3	3	3	2	0%	*
Faculty PT	5	5	4	4	4	-20%	

* In the years 2002 through 2004, two of the faculty members were full-time Computer Science instructors, and one faculty member was a full-time Mathematics instructor. In 2005 one faculty member was a full-time Computer Science instructor, and one faculty member was a full-time Mathematics instructor.

Staffing for the Computer Science Learning Center:

Position	Staffing Levels for Each of the Previous Five Years					% Change from Year 1 to Year 5	
	2001	2002	2003	2004	2005		
Administration							
Classified Staff FT							
Classified Staff PT							
Faculty FT	4	4	4	3	3	-25%	*
Faculty PT	3	4	4	4	3	0%	**

* There is one full-time Computer Science instructor assigned to the Learning Center for load. This is a two-for-one assignment, i.e. two hours in the Learning Center are equivalent to one hour in the classroom.

In 2001 through 2003, there was one full-time Computer Science instructor and two full-time Mathematics instructors working in the Learning Center as overload, on a one-for-one basis.

** All part-time faculty work in the Learning Center on a one-for-one basis.

C. SLO Assessment Forms

The Computer Science department developed Student Learning Outcomes for the program in September of 2005.

There are no SLO Assessment forms available at this time. They are currently being developed by the department.

Computer Science
Data Set for Program Review
September 2005

Overview of Sections, C1 & End of Term Enrollment and Average Enrollment/Section

Computer Science Program

Year	Term	Number of Sections	C1 Enrollment (Duplicated Headcount)	End of Term Enrollment	Average Enrollment/Section
2000	Fall	13	403	285	31
2001	Fall	14	446	333	31.9
2002	Fall	14	403	297	28.8
2003	Fall	13	341	336	26.2
2004	Fall	13	284	273	21.8
2001	Spring	15	431	279	28.7
2002	Spring	14	397	289	28.4
2003	Spring	13	347	245	26.7
2004	Spring	12	243	183	20.3
2005	Spring	12	223	161	18.6
2001	Summer	2	78	62	39
2002	Summer	2	57	57	28.5
2003	Summer	2	61	44	30.5
2004	Summer	2	55	43	27.5

Computer Science Learning Center

Year	Term	Number of Sections	C1 Enrollment (Duplicated Headcount)	End of Term Enrollment	Average Enrollment/Section
2004	Fall	0	0	0	0.0
2003	Fall	18	1,329	1,319	73.8
2002	Fall	18	1,428	1,071	79.3
2001	Fall	18	1,559	1,208	86.6
2000	Fall	18	1,398	1,067	77.7
2005	Spring	0	0	0	0.0
2004	Spring	18	1,096	861	60.9
2003	Spring	18	1,302	930	72.3
2002	Spring	18	1,407	1,082	78.2
2001	Spring	18	1,739	1,099	79.9
2004	Summer	4	191	162	47.8
2003	Summer	5	188	170	37.6
2002	Summer	4	99	99	24.8
2001	Summer	6	121	105	20.2

Data Source: SOCCCD Leadership Information System (LIS) Enrollment Summary Report, September 2005
Prepared by Denice Inciong, Research and Planning Analyst

Computer Science Program
Data Set

The following pages include:

1. **Overview of Courses, Grades, Success/Retention (excludes CS 999)**
2. **Course Grades, Success/Retention**
3. **Computer Science Courses' Students' Duplicated Headcount**
   a. **Gender**
   b. **Zip Code**
   c. **Ethnicity**
   d. **Educational Goal**

Data Source: SOCCCD Management Information System (MIS) Data Warehouse, September 2005

Prepared by Denice Inciong, Research and Planning Analyst, Saddleback College

Computer Science Program
Courses by Grade/Success/Retention (Note: Excludes CS 999 - ungraded lab course)

		Grades									
		A	B	C	CR	D	F	I	NC	W	XX
		Count	Count	Count	Count	Count	Count	Count	Count	Count	Count
2001	Spring	100	69	37	2	18	31	1	1	99	47
	Summer	34	16	5	0	5	2	0	0	12	4
	Fall	117	91	57	1	27	32	5	2	81	32
2002	Spring	97	89	37	1	17	36	0	2	84	29
	Summer	23	14	11	0	4	4	1	0	4	5
	Fall	120	77	49	1	20	31	0	0	67	40
2003	Spring	90	53	24	4	29	37	0	0	51	32
	Summer	25	16	7	0	4	2	2	0	5	2
	Fall	89	49	41	3	20	37	2	1	58	26
2004	Spring	79	30	32	1	11	30	0	1	28	23
	Summer	21	11	2	0	1	6	0	2	3	4
	Fall	75	44	35	4	11	46	0	0	44	24
2005	Spring	63	34	28	0	6	29	0	1	43	17
	Summer	0	0	0	0	0	0	0	0	0	0
	Fall	0	0	0	0	0	0	0	0	0	0

Grade XX = None of the above/unknown.

Success Rate: Percent of students successful in courses out of total enrolled in courses (RP Group, 1996).
The success rate is calculated by dividing the numerator (number of students duplicated with A, B, C, CR) by the denominator (number
W, I, XX)

Retention Rate: Percent of students retained in courses out of total students enrolled in courses (RP Group, 1996).
The retention rate is calculated by dividing the numerator (number of students duplicated with A, B, C, D, F, CR, NC, I, XX) by the den
B, C, D, F, CR, NC, W, I, XX).

Course by Grade/Success/Retention

			Grades										
			A	B	C	CR	D	F	I	NC	UG	W	X
Course	Year	Term	Count	Count	Count	Count	Count	Count	Count	Count	Count	Count	C
CS 1A	2001	Spring	31	31	20	1	13	11	1	0	0	52	
		Summer	17	12	3	0	4	0	0	0	0	5	
		Fall	51	54	30	1	15	16	0	0	0	31	
	2002	Spring	22	30	10	0	7	11	0	2	0	37	
		Summer	14	8	6	0	2	3	0	0	0	1	
		Fall	49	36	26	0	11	20	0	0	0	26	
	2003	Spring	37	22	11	1	15	18	0	0	0	16	
		Summer	18	7	4	0	2	1	0	0	0	3	
		Fall	41	26	27	2	13	24	1	0	0	18	
	2004	Spring	28	8	14	0	5	12	0	0	0	13	
		Summer	16	7	2	0	1	4	0	1	0	1	
		Fall	39	17	20	2	10	27	0	0	0	20	
	2005	Spring	29	9	9	0	2	12	0	0	0	19	
CS 1B	2001	Spring	17	19	8	1	2	11	0	0	0	26	
		Summer	17	4	2	0	1	2	0	0	0	7	
		Fall	18	11	10	0	5	6	3	0	0	20	
	2002	Spring	27	32	18	1	2	9	0	0	0	22	
		Summer	9	6	5	0	2	1	1	0	0	3	
		Fall	27	15	5	0	4	6	0	0	0	15	
	2003	Spring	20	12	8	1	10	16	0	0	0	14	
		Summer	7	9	3	0	2	1	0	0	0	2	
		Fall	15	9	6	1	5	6	0	1	0	17	
	2004	Spring	13	8	14	0	4	10	0	0	0	11	
		Summer	5	4	0	0	0	2	0	1	0	2	
		Fall	10	8	6	2	1	7	0	0	0	11	
	2005	Spring	12	12	9	0	2	4	0	0	0	16	

Grade XX = None of the above/unknown.

Success Rate: Percent of students successful in courses out of total enrolled in courses (RP Group, 1996).
The success rate is calculated by dividing the numerator (number of students duplicated with A, B, C, CR)
by the denominator (number of students with A, B, C, D, F, CR, NC, W, I, XX)

Retention Rate: Percent of students retained in courses out of total students enrolled in courses (RP Group, 1996).
The retention rate is calculated by dividing the numerator (number of students duplicated with A, B, C, D, F, CR, NC, I*, XX)
by the denominator (number of students with A, B, C, D, F, CR, NC, W, I, XX).

Course by Grade/Success/Retention

			Grades										
			A	B	C	CR	D	F	I	NC	UG	W	XX
Course	Year	Term	Count	Count	Count	Count	Count	Count	Count	Count	Count	Count	Cou
CS 1C	2001	Spring	17	6	3	0	2	2	0	0	0	14	
		Fall	11	11	7	0	4	4	1	1	0	11	
	2002	Spring	10	9	2	0	2	2	0	0	0	12	
		Fall	18	8	8	0	3	2	0	0	0	18	
	2003	Spring	4	5	3	1	3	0	0	0	0	3	
		Summer	0	0	0	0	0	0	2	0	0	0	
		Fall	8	4	4	0	2	2	1	0	0	10	
	2004	Spring	9	5	4	0	1	1	0	0	0	1	
		Fall	6	5	2	0	0	4	0	0	0	4	
	2005	Spring	5	4	4	0	1	3	0	0	0	2	
CS 2B	2001	Spring	8	8	2	0	1	4	0	1	0	3	
		Fall	2	1	1	0	1	2	0	0	0	3	
	2002	Spring	5	2	4	0	1	4	0	0	0	6	
		Fall	2	3	0	0	0	2	0	0	0	3	
	2003	Spring	4	5	0	0	0	2	0	0	0	6	
		Fall	4	1	0	0	0	2	0	0	0	7	
	2004	Spring	3	4	0	0	0	1	0	0	0	1	
		Fall	5	3	1	0	0	4	0	0	0	0	
	2005	Spring	5	4	4	0	0	4	0	1	0	1	
3A		Fall	17	10	3	0	0	1	0	1	0	9	
	2002	Spring	8	3	1	0	2	5	0	0	0	5	
		Fall	13	5	1	0	1	0	0	0	0	2	
	2003	Spring	10	3	1	0	0	1	0	0	0	2	
		Fall	9	6	1	0	0	0	0	0	0	1	
	2004	Fall	8	7	3	0	0	3	0	0	0	6	

Grade XX = None of the above/unknown.

Success Rate: Percent of students successful in courses out of total enrolled in courses (RP Group, 1996).
The success rate is calculated by dividing the numerator (number of students duplicated with A, B, C, CR)
by the denominator (number of students with A, B, C, D, F, CR, NC, W, I, XX)

Retention Rate: Percent of students retained in courses out of total students enrolled in courses (RP Group, 1996).
The retention rate is calculated by dividing the numerator (number of students duplicated with A, B, C, D, F, CR, NC, I*, XX)
by the denominator (number of students with A, B, C, D, F, CR, NC, W, I, XX).

Course by Grade/Success/Retention

			Grades									
			A	B	C	CR	D	F	I	NC	UG	W
Course	Year	Term	Count	Count	Count	Count	Count	Count	Count	Count	Count	Count
CS 3B	2001	Spring	11	4	0	0	0	1	0	0	0	1
		Fall	8	2	1	0	0	1	0	0	0	2
	2002	Spring	13	6	2	0	3	3	0	0	0	1
		Fall	5	2	2	0	1	1	0	0	0	0
	2003	Spring	8	2	0	0	1	0	0	0	0	2
	2004	Spring	12	2	0	0	0	5	0	1	0	2
	2005	Spring	5	2	0	0	0	5	0	0	0	5
CS 4A	2001	Fall	10	2	5	0	2	2	1	0	0	5
	2002	Fall	6	8	7	1	0	0	0	0	0	3
	2003	Fall	12	3	3	0	0	3	0	0	0	5
	2004	Fall	7	4	3	0	0	1	0	0	0	3
CS 4B	2002	Spring	12	7	0	0	0	2	0	0	0	1
	2003	Spring	7	4	1	1	0	0	0	0	0	8
	2004	Spring	14	3	0	1	1	1	0	0	0	0
	2005	Spring	7	3	2	0	1	1	0	0	0	0
CS189	2001	Spring	6	0	0	0	0	0	0	0	0	1
CS 999	2001	Spring	0	0	0	0	0	0	0	0	0	0
		Summer	0	0	0	0	0	0	0	0	0	0
		Fall	0	0	0	0	0	0	0	0	0	0
	2002	Spring	0	0	0	0	0	0	0	0	0	0
		Summer	0	0	0	0	0	0	0	0	0	0
		Fall	0	0	0	0	0	0	0	0	0	0
	2003	Spring	0	0	0	0	0	0	0	0	468	0
		Summer	0	0	0	0	0	0	0	0	0	0
		Fall	0	0	0	0	0	0	0	0	486	0
	2004	Spring	0	0	0	0	0	0	0	0	376	0

Grade XX = None of the above/unknown.

Success Rate: Percent of students successful in courses out of total enrolled in courses (RP Group, 1996).

The success rate is calculated by dividing the numerator (number of students duplicated with A, B, C, CR) by the denominator (number of students with A, B, C, D, F, CR, NC, W, I, XX)

Retention Rate: Percent of students retained in courses out of total students enrolled in courses (RP Group, 1996).

The retention rate is calculated by dividing the numerator (number of students duplicated with A, B, C, D, F, CR, NC, I*, XX) by the denominator (number of students with A, B, C, D, F, CR, NC, W, I, XX).

Computer Science Program
Gender by Year/Term
Duplicated Headcount

		F		M		X		Total	
		Count	Row %	Count	Row %	Count	Row %	Count	Row %
2001	Spring	303	24.6%	927	75.4%	0	.0%	1230	100.0%
	Summer	68	34.3%	130	65.7%	0	.0%	198	100.0%
	Fall	309	23.3%	1012	76.4%	3	.2%	1324	100.0%
2002	Spring	287	24.8%	870	75.2%	0	.0%	1157	100.0%
	Summer	35	19.7%	143	80.3%	0	.0%	178	100.0%
	Fall	223	20.0%	894	80.0%	0	.0%	1117	100.0%
2003	Spring	156	17.4%	741	82.6%	0	.0%	897	100.0%
	Summer	37	21.4%	136	78.6%	0	.0%	173	100.0%
	Fall	116	12.4%	819	87.6%	0	.0%	935	100.0%
2004	Spring	78	11.3%	612	88.7%	0	.0%	690	100.0%
	Summer	8	16.0%	42	84.0%	0	.0%	50	100.0%
	Fall	38	13.4%	245	86.6%	0	.0%	283	100.0%
2005	Spring	31	14.0%	190	86.0%	0	.0%	221	100.0%

Computer Science Program by Zip Code
Duplicated Headcount

		Saddleback Zip		Irvine Zip		Out of District or Missing		Total	
		Count	Row %	Count	Row %	Count	Row %	Count	Row %
2001	Spring	1092	88.8%	57	4.6%	81	6.6%	1230	100.0%
	Summer	177	89.4%	5	2.5%	16	8.1%	198	100.0%
	Fall	1181	89.2%	72	5.4%	71	5.4%	1324	100.0%
2002	Spring	1057	91.4%	57	4.9%	43	3.7%	1157	100.0%
	Summer	169	94.9%	3	1.7%	6	3.4%	178	100.0%
	Fall	979	87.6%	55	4.9%	83	7.4%	1117	100.0%
2003	Spring	813	90.6%	25	2.8%	59	6.6%	897	100.0%
	Summer	154	89.0%	9	5.2%	10	5.8%	173	100.0%
	Fall	877	93.8%	15	1.6%	43	4.6%	935	100.0%
2004	Spring	649	94.1%	9	1.3%	32	4.6%	690	100.0%
	Summer	41	82.0%	2	4.0%	7	14.0%	50	100.0%
	Fall	253	89.4%	13	4.6%	17	6.0%	283	100.0%
2005	Spring	193	87.3%	9	4.1%	19	8.6%	221	100.0%

Computer Science Program
Ethnicity by Year/Term
Duplicated Headcount

		Ethnic Groups																
		Asian		African American		Hispanic		American ndian/Alaskan Nativ		Other		Pacific Islander		White		Unknown		
		Count	Row %	Count	Row %	Count	Row %	Count	Row %	Count	Row %	Count	Row %	Count	Row %	Count	Row %	Coun
2001	Spring	300	24.4%	10	.8%	182	14.8%	5	.4%	13	1.1%	3	.2%	642	52.2%	75	6.1%	123
	Summer	64	32.3%	2	1.0%	10	5.1%	0	.0%	3	1.5%	0	.0%	116	58.6%	3	1.5%	19
	Fall	325	24.5%	6	.5%	170	12.8%	6	.5%	18	1.4%	6	.5%	672	50.8%	121	9.1%	132
2002	Spring	235	20.3%	12	1.0%	105	9.1%	7	.6%	8	.7%	0	.0%	670	57.9%	120	10.4%	115
	Summer	27	15.2%	0	.0%	22	12.4%	2	1.1%	6	3.4%	3	1.7%	98	55.1%	20	11.2%	17
	Fall	233	20.9%	20	1.8%	124	11.1%	12	1.1%	6	.5%	3	.3%	645	57.7%	74	6.6%	111
2003	Spring	191	21.3%	12	1.3%	112	12.5%	7	.8%	6	.7%	3	.3%	491	54.7%	75	8.4%	89
	Summer	34	19.7%	0	.0%	25	14.5%	0	.0%	6	3.5%	0	.0%	94	54.3%	14	8.1%	17
	Fall	143	15.3%	5	.5%	84	9.0%	2	.2%	17	1.8%	3	.3%	590	63.1%	91	9.7%	93
2004	Spring	126	18.3%	12	1.7%	68	9.9%	0	.0%	6	.9%	3	.4%	425	61.6%	50	7.2%	69
	Summer	7	14.0%	2	4.0%	8	16.0%	0	.0%	1	2.0%	0	.0%	28	56.0%	4	8.0%	5
	Fall	40	14.1%	6	2.1%	28	9.9%	3	1.1%	6	2.1%	1	.4%	179	63.3%	20	7.1%	28
2005	Spring	28	12.7%	3	1.4%	22	10.0%	2	.9%	1	.5%	2	.9%	145	65.6%	18	8.1%	22

Computer Science Program
Educational Goals by Year/Term
Duplicated Headcount

	2001				2002				2003				
	Spring		Fall		Spring		Fall		Spring		Fall		
	Count	Column %	Count	Column %	Count	Column %	Count	Column %	Count	Column %	Count	Column %	Cou
AA/AS and transfer	415	33.7%	418	31.6%	370	32.0%	392	35.1%	321	35.8%	336	35.9%	2
Transfer w/o AA/AS	230	18.7%	219	16.5%	213	18.4%	234	20.9%	232	25.9%	188	20.1%	1
AA/AS w/o transfer	14	1.1%	9	.7%	6	.5%	0	.0%	3	.3%	8	.9%	
2-yr Voc. w/o transfer	8	.7%	21	1.6%	1	.1%	8	.7%	11	1.2%	12	1.3%	
Voc. certif. w/o transfe	143	11.6%	171	12.9%	184	15.9%	160	14.3%	124	13.8%	130	13.9%	1
Discover interests	43	3.5%	55	4.2%	51	4.4%	48	4.3%	34	3.8%	53	5.7%	
Acquire job skills	151	12.3%	162	12.2%	108	9.3%	109	9.8%	50	5.6%	71	7.6%	
Update job skills	63	5.1%	59	4.5%	62	5.4%	37	3.3%	43	4.8%	40	4.3%	
Maintain cert. or lisc.	0	.0%	9	.7%	0	.0%	3	.3%	2	.2%	0	.0%	
Ed. development	26	2.1%	65	4.9%	48	4.1%	27	2.4%	25	2.8%	33	3.5%	
Basic Skills	0	.0%	9	.7%	6	.5%	0	.0%	0	.0%	2	.2%	
HS or GED	5	.4%	0	.0%	3	.3%	0	.0%	0	.0%	0	.0%	
Undecided	132	10.7%	127	9.6%	105	9.1%	99	8.9%	52	5.8%	62	6.6%	
Total	1230	100.0%	1324	100.0%	1157	100.0%	1117	100.0%	897	100.0%	935	100.0%	6

E. Others