Program Performance Review
Department of Chemistry and Biochemistry
Spring, 2009

SELF STUDY

I. Department Mission, Goals and Environment

A. Department Mission and Goals

In response to the last PPR (in 2002), the department thoroughly re-examined its mission, goals and environment and formulated consensus statements of its vision and core values (Appendix VII). The vision statements capture the essence of what we decided we wanted to be and strive towards, namely to:

1. Create a collegial, collaborative, supportive environment and departmental structure that nurture professional relationships, enrich teaching and learning, develop and strengthen scholarship, and encourage professional service.
2. Be a leader in undergraduate and master's level research.
3. Offer a rigorous and contemporary curriculum that is responsive to future developments, reflects the interdisciplinary nature and diversity of the chemical sciences, and enables students to become successful professionals, scholars, scientifically literate citizens and leaders.
4. Make significant contributions to and have major/notable impact on chemical education, teacher preparation and professional development in the region.
5. Promote excellence in service to the department, university and community, and cultivate ties with local and regional industry and academic institutions.

These goals and perceived missions do not deviate from those of the past (including the past PPR). However, they represent the first effort we are aware of on the part of the department faculty and staff as a group, to rethink, formulate and put to paper consensus statements on this subject.

These statements (detailed in our core values, given in the Appendix), and the strategies we are and will be using to carry out our goals, are in complete agreement with the mission, goals and strategies of the university. This is particularly the case with regard to goals I a,b,e,g, (including promoting the preeminence of learning by integrating teaching, scholarly and creative activities and the exchange of ideas into our curriculum and student experience; integrating advances in information technology; recruiting highly qualified faculty and staff); II a,b (supporting undergraduate and graduate programs in professional and preprofessional studies in chemistry, biochemistry and related disciplines; providing opportunities to learn through internships and other off campus activities); III a,e (promoting a culture and personnel document supportive of research and the involvement of students in faculty research); V b,f,g (providing a safe and diversity-friendly environment, with opportunities to support disadvantaged students in research activities by defraying their costs with financial support from extramural sources); VI c (encourage faculty to obtain extramural grants in support of curricular and scholarly department activities). [University Missions and Goals are attached as Appendix IX.]

B. Changes and Trends

Major changes and trends in our discipline (and the needs of our graduates going into industry) to which we have been and will be responding are:
(a) re-assessments by the American Chemical Society of its guidelines for certified degrees in chemistry and biochemistry;

(b) the need to strengthen our less rigorous degree (BA Chemistry) by adding more practical laboratory training;
(c) developing and adding to information about our programs and our course syllabi descriptions of student learning outcomes and their assessments;
(d) responding to a perceived need by local industry for individuals with a Professional Science Master's Degree in chemical sciences, where wider technical laboratory training and collaborative projects are substituted for a thesis in basic research;
(e) the need to integrate information technology into our courses, and develop online courses or hybrids thereof, to better serve our student constituency and compete with other institutions;
(f) a need to reconsider the structure and content of our environmental chemistry emphasis (and its courses), to be more focused on issues of sustainability and green chemistry, and how our activities can be part of the university's wider efforts to promote sustainability.

C. Department Priorities for the Future

We have been working to develop a set of priorities for the future, through a series of surveys and department discussions, which will be continuing at least over the next year. Priorities that have emerged are:
(a) developing and reviewing a 10 year strategic plan for the department as a whole (longer than the present one), including for the maintenance and updating of our infrastructure with regard to equipment, and future needs for space to house additional faculty and laboratory courses;
(b) better integration of our undergraduate curriculum from one level to another and across all levels, using our developed programmatic student learning outcomes as a guide;
(c) developing some contemporary, truly interdisciplinary courses;
(d) making efforts to "green" our laboratory courses, where appropriate;
(e) revising and rethinking our department personnel standards, considering greater flexibility, the current climate for outside funding, standards and approaches used in comparable CSU department guidelines, and the department's commitment to chemistry education research;
(f) redesigning/rethinking the BS biochemistry degree so that it has elective units;
(g) developing guidelines for the "capstone" research experience required of our majors under the current UG degrees, to make it more explicit and more amenable to assessment;
(h) finding new ways to minimize student attrition but also making sure that students do not advance from one level to another without the proper background (enforcing pre-requisites).
(i) the need to adequately mentor and support the development of our new faculty (already on board and future hires), and annually review our faculty hiring plans.
(j) developing online courses in the major, as well as IT training programs on laboratory safety, preparing posters (for conference presentations), writing research reports, and the like.

(k) We have already taken advantage of remotely enabled instruments (NMR, EPR, CD, X-ray) that use end-to-end cyber-infrastructure and the internet for instrumentation training, data collection, and data analysis.
(l) The department is also committed to expanding course offerings to the satellite Irvine campus as soon as facilities (including laboratories) are available.

II. Department Description and Analysis

A. Curricular Changes and New Degrees (since the last PPR)

The BA chemistry degree was strengthened by (a) substituting the 306 A/B organic chemistry laboratories for 302; (b) requiring 1 unit of instrumentation course modules (411), and adding Biological Chemistry (Chem 421) as a requirement for graduation.

Due to changes in the biology curriculum, in which 3 unit courses expanded into 5 units, the BS biochemistry degree had to be adjusted. The biotechnology course (Chem/Bio 477) was made a requirement to cover aspects of molecular biology (and transcription/translation), and options for taking other biology courses for the degree were eliminated, to avoid increasing the number of credits needed for the degree. This has worked. However, the degree currently has no electives, and reconsidering what should be part of this degree and how to allow electives in the future is a department priority.

An MA degree in chemistry/biochemistry was proposed and has been approved by the NSM and university curriculum committees. It is distinct from our Master of Science degree in that it requires additional instrumentation and lecture courses as well as a library project (research proposal or review article) instead of the laboratory thesis or project.

The General Education curriculum was expanded by instituting two new course offerings in modular form (three individual units), one set in Environmental Pollution and Solutions (313ABC), the other in Biotechnology (303ABC). Enrollments have been satisfactory (in the range of 15-35 students).

One major curricular change mandated by the Chancellor's office was the development of a general chemistry/organic chemistry/biochemistry course (Chem 200) as a staple for the new nursing program. This is currently in its third year and now carries 5 units, including activity and laboratory. (Initially it was a 4-unit course with only lecture and lab; in Fall 2008 the activity unit was added for the first time.) As mentioned earlier, we now require entering students to take the placement test for general chemistry (Chem 120A), those passing being eligible for Chem 200, those not having to first take Chem 115. In addition to the mandatory activity sessions, this may be at least partly responsible for increased rates of student success in the nursing course. Thus, The class average has increased from about 65% to slightly above 70%. However, a few other factors also changed in this timeframe, and to be sure about the effectiveness of these exams and activities, we will continue to monitor student success in this course.

B. Demand for Course Offerings

Demand for our courses at both the undergraduate and graduate levels grew markedly since the last program review (a 60% increase in FTES). This is largely because to meet demands for our major and service courses, we expanded the numbers of sections offered in our general chemistry and organic chemistry lecture and laboratory courses (120AB, and 301AB), as well as the pre-major (basic or remedial) entry into chemistry course (115), also reworking and refining our procedures for testing into or out of 120A (now also provided through the campus testing service). In response to additional demand from our majors, we expanded the size of the quantitative/analytical chemistry lecture (315), offered additional sections of the quantitative chemistry laboratory (316), as well as a workshop to help students succeed in 315 (315W); added additional sections of the biochemistry laboratory (422) and increased enrollments in the year-long general biochemistry (423A and B) and biotechnology (477) courses. In the General Education category, we expanded sections of Chem 100 (chemistry for non-science majors), including one in the evening, to meet demand.

Data in Appendix I (Tables 1A and B) show that applications for, and enrollments in, our three undergraduate degree programs have risen significantly since 2002-2004, the numbers for both approximately doubling, with the percentages of those admitted and enrolled staying about the same: about 70 and 50% of freshmen and transfer students, respectively, being admitted, and 20 and 40-50% of those admitted, respectively, actually enrolling. About two thirds of our majors are going for the BS biochemistry degree, most of the rest for the BS in chemistry. [Enrollment for our BA degree has declined somewhat, headcounts going from about 30 in 2003 to about 18 at present; Appendix I (Table 2B); while that in the BS chemistry program has doubled from about 40 to 80.]

Most of our majors require 6 years to obtain their degrees, in large part because of their need to work to support themselves while enrolled. As indicated in Appendix III, Tables 3A and B, the percentages of students declaring majors in our department (BS and BA chemistry, as well as BS biochemistry) upon arrival that graduate within 6 years hovers around 40-50% for those entering as freshmen and is about 60-80% for upper division transfer students. However, only about half of those entering as our majors graduate with degrees in our major. [Note that the portion of the Tables highlighted in yellow is the percentage of students graduating from CSUF, and the percentages graduating in chemistry/biochemistry data are two columns to the left. Please also note that the data are tracking students entering college in 1998, and that the numbers for the BS (and BA) chemistry degree are small (while BS enrollments since then have increased markedly, as already noted).] This indicates first, that a large percentage of our entering freshmen (and a sizeable portion of those that transfer) never graduate from CSUF. Second, we lose a large percentage of our initially-declared majors to other departments (probably mostly biology).]

Factors that we feel are contributing both to the attrition of our declared majors and to the length of time students spend before graduating are (a) poor preparation (in math and chemistry, as well as English), and (b) poor study habits, which we have been trying to address in our new student orientations, frequent advisements, and in the classroom ("Study 25-35 hours per week"). Despite screening students for entry into the major's general chemistry course (120A), about 23% of students enrolled fail to obtain a grade of C or better and must repeat the course. Similar (or slightly higher) percentages of students repeat the core organic chemistry courses, 12-19% the physical chemistry courses, and 10-19% the core biochemistry courses. These general and organic chemistry data (from 2007-2008) do not distinguish between our majors and those of other disciplines (mostly biology); those for physical and biochemistry are much more major-specific and have somewhat lower repeat rates. Of greatest concern is the repeat rate for our analytical chemistry course (315), which was 36% in 2007-2008, 13% repeating twice, which we again feel reflects poorly developed mathematical skills. We are counting on workshops and recitations (see III.D.d) focusing on problem solving, to improve the situation in the future. In addition, we hope that making rigorous and regular efforts to integrate our curriculum, so that the most vital concepts, skills and processes are repeated and re-enforced throughout our courses (as identified in our SLOs), will increase the likelihood of retaining and graduating our majors. At the same time, there is only so much we as faculty can do to promote student learning; and the motivations and habits of many of our students are a significant hurdle.

C. Enrollment Trends

Enrollments in our courses increased 60% over the last 7 years. Department FTES targets were exceeded every year since the last PPR, and it has been difficult to curtail growth during the current budget crisis. Actual FTES went from 279.2 (in 2001-2002) to 474 (in 2008-2009), the latter again being above the year's department projection of 437. (See also Appendix I, Table 2A.) Annualized head counts of our undergraduate majors increased slightly more, from 239 (in 2003-4) to 408 in 2008-2009, or 60% in 6 years (Appendix I, Table 2B). From 2002-2008, the total number of undergraduate degrees conferred averaged 39 annually, varying from 33 to 48, with no obvious trend (Appendix I, Table 4). We expect that these numbers will rise markedly in the future because of our increased enrollments in the majors, leading to increased numbers of students graduating.

Graduate student enrollment has been adequate but not as large as we would like and has not changed significantly. Annualized headcounts of graduate students have varied from 37.5 to 51, and the graduate student FTES has hovered around 12 (Appendix II, Tables 5 and 6A). The numbers of applications have varied from 51 to 73 per year, with no trend, while the percentages admitted have dropped from 60-74% (in 2003-2005) to 41-52% (in 2005-2009). Admissions have been more stringent because of concerns about the failure rates of incoming students whose records were borderline. The acceptable GPA was raised from 2.5 to 2.75 with an emphasis on science courses in general and chemistry and biochemistry courses in particular. Of special concern are international students for which it is often difficult to verify the quality of the undergraduate coursework. Furthermore, many international students enter our program with degrees other than chemistry or biochemistry, which usually means they have to take remedial coursework, along with adjusting to an English language-based curriculum. As a result, most of the students dropping out of the program are international students. For fall 2009, we have added the requirement of taking the GRE subject exam (chemistry or biochemistry preferred; other areas of physical sciences may be acceptable) for students who did not obtain their undergraduate degree from a United States accredited institution. Although it is too early to tell whether these measures are having the positive effect we are hoping for, we are confident that in the long run this will benefit our program and the students.

About 15 new graduate students enter our program each year. About one third of these obtained undergraduate degrees (in chemistry, biochemistry, or biology) from our college. Just under half of those enrolling in our program complete their Master's degrees (about 7 annually), most within 4 years (Appendix II, Tables 7 and 8). About half of our graduates enter PhD programs. Quite a few of our Master's students enter such programs before completing their degrees. Some students (about 10%) enter professional schools (dental, medical, and pharmacy) and the rest generally enter the scientific/technical workforce in good positions. Most graduate classes have 10-15 students, and overall, there are sufficient graduate students to support and (with their faculty mentors) constitute a community of scholars and conduct the graduate program. We have, however, submitted a proposal for a MA Chemistry degree that we hope will bring more students into our graduate classes.

During this period, 7 faculty FERP'd and/or completely retired (from FERPing), and 8 new tenure track faculty and one full time lecturer were hired. [Recent searches for an additional faculty member were halted, and two of the untenured faculty are leaving (see more below).] Growth in the numbers of full time faculty is thus lagging far behind the increase in numbers of students served. Classes are larger; more of the teaching is done by part time lecturers. [Appendix IV, Table 9 shows that we doubled the numbers of part time lecturers from 5-7 (in 2003-6) to 10-13 (2004-present).] We are hampered in hiring additional research-active faculty for lack of adequate research laboratory space (which will require costly renovations or new construction) as well as the availability of adequate startup funds to equip the laboratory and provide initial supplies. Thus, in the current budget climate, we feel that hiring additional full time lecturers will be helpful (see later). Student to faculty ratios increased marginally, from a low of 15.2 (2002) to a high of 16.0 and the present 15.8 (Appendix IV, Table 9).

D. Plans for Curricular Changes

Short term:

(a) we have already planned and will shortly be implementing our Master of Arts in Chemistry degree, which we expect will increase enrollments in our graduates courses, particularly in the areas of chemistry outside of biochemistry;

(b) we will be re-considering how to restructure our BS Biochemistry degree to allow some elective courses;

(c) we have been discussing ways to make the "capstone" experience for our three current undergraduate degree programs (BS chemistry, BA chemistry, BS biochemistry) more explicit and easier to assess by developing appropriate guidelines and utilizing rubrics for the oral and written reports for the different chemistry sub-disciplines represented;

(d) we have plans, already in discussion for the last year, to develop an Applied Chemistry track under the aegis of the BS chemistry program, thus offering our majors more flexible course requirement options and electives.

Long term, the faculty have identified the need to:

(a) review and revamp our laboratory courses, to make them more current in learning approaches and content (including emerging areas and technology);
(b) consider how to "green" and appropriately "microscale" the laboratory courses, where possible;
(c) consider what one-unit laboratory modules might be worth developing in new areas, such as in biotechnology (involving fundamental and state of the art techniques used in molecular biology and in the biotech industry), materials science, and additional specialized instrumentation;
(d) continue to work on integrating our curriculum.

III. Documentation of Student Academic Achievement and Assessment of Student Learning Outcomes

A. How Well Are Students Learning What the Program is Designed to Teach?

We developed detailed programmatic student learning outcomes (SLOs) covering all our undergraduate degree programs, and means for their assessment in the areas of concepts, skills and processes, as well as attitudes, in 2007 and 2008. This year, we are completing SLOs and assessment guidelines for each of our individual bachelor's degrees. Based on the assessments we have identified and have been using so far, a significant percentage of students entering our degree programs have difficulties passing our courses with a required grade of "C" or better. We have a sense that we lose majors particularly in the first couple of years, when they are going through Chem 120AB. As already noted (Section II, B) many of our students have to repeat courses as they go along. Despite these problems (which we are continuously trying to remedy in various ways), we do graduate a substantial percentage of our students: Consider that we had 239 majors in 2003-2004 and graduated an average of 39 (one 6th) every year. Moreover, based upon the performance of our students in the capstone experience for the degrees (which involves research as well as oral and written reports provided or submitted for evaluation to faculty outside the mentor's laboratory), our students generally graduate with a decent grounding in the theory and practice of chemistry and/or biochemistry, and the advantage of practical laboratory research experience, as well as safety training and practice. We will have a better sense of all this in the future, as we implement our developing assessment strategies.

B. What Direct Strategies or Systematic Methods are Utilized to Measure Student Learning?

The strategies and methods we are now utilizing and refining to measure student learning are summarized in the tables below that match particular SLOs with particular assessment strategies. As mentioned above, we are just preparing additional guidelines for assessing program-unique SLOs, as well as guidelines for assessing the central components of the capstone experience.

CONCEPTS

	Program SLO	Program SLO Assessment
1	Demonstrate an understanding of the concept that all matter is composed of atoms whose	Students must pass all required lecture and laboratory courses for the baccalaureate degree

	inherent periodic properties determine their interactions and combinations into compounds with specific molecular structure, chemical function, and physical properties.	with a grade of C or better. American Chemical Society standardized exams will be used to assess understanding of these concepts in lower division courses.
2	Demonstrate an understanding of, and ability to apply, fundamental thermodynamic laws and kinetics to chemical reactions in equilibrium and non-equilibrium systems.	Students must pass all required lecture and laboratory courses for the baccalaureate degree with a grade of C or better. American Chemical Society standardized exams will also be used to assess understanding of these concepts in lower division courses.
3	Be literate in concepts underlying fundamental analytical instrumentation and instrumentation techniques used in chemistry and biochemistry.	Students must pass all required lecture and laboratory courses for the baccalaureate degree with a grade of C or better. The CHEM 495/499 poster and research paper will be evaluated for evidence of this literacy.
4	Develop an understanding of the various ways that chemists represent and test chemical knowledge in models, theories, mathematical relationships, and symbolic notations.	Students must pass all required lecture and laboratory courses for the baccalaureate degree with a grade of C or better. The CHEM 495 or 499 poster and research paper will be evaluated for evidence of this understanding. Independent projects, which expect students to understand these concepts, are incorporated into the curriculum.
5	Demonstrate an understanding of the principles of safe practices in the laboratory across the subdisciplines of the chemical sciences.	Students must pass all required laboratory courses for the baccalaureate degree with a grade of C or better. The CHEM 495/499 research paper will be evaluated for evidence of this understanding.

SKILLS AND PROCESSES

Program SLO	**Program SLO Assessment**
Generate data and information through the design and safe implementation of experiments using contemporary methods and techniques.	The CHEM 495/499 research paper will be evaluated for evidence of these skills and processes. Students must pass all required laboratory courses for the baccalaureate degree with a grade of C or better.
Collect, analyze and interpret data and information.	The CHEM 495/499 research paper will be evaluated for evidence of these skills and processes. Students must pass all required laboratory courses for the baccalaureate degree with a grade of C or better.
Retrieve appropriate scientific literature and data.	The CHEM 495/499 research paper will be evaluated for evidence of these skills and processes. Students must pass all required laboratory courses for the baccalaureate degree with a grade of C or better.
Communicate data, concepts, skills and processes to experts and non-experts in the field.	The CHEM 495/499 poster, interview, and research paper will be evaluated

	for evidence of these skills and processes. Students must pass all required laboratory courses for the baccalaureate degree with a grade of C or better.

ATTITUDES

	Program SLO	**Program SLO Assessment**
1	Demonstrate the safe and ethical use of scientific knowledge, materials and procedures and be able to explain their impact on a diverse society.	Students must complete a safety workshop in order to conduct research required for the baccalaureate degree. Upper division courses, for example, CHEM 435 and 477, include short essay items that ask the student to explain the impact of scientific ethics on society. Students must pass all required upper division courses for the baccalaureate degree with a grade of C or better.
2	Deliberately employ the methods of scientific inquiry to collect, analyze and interpret evidence to solve problems while recognizing the tentative nature of scientific knowledge.	The CHEM 495/499 poster, interview, and research paper will be evaluated for evidence of these attitudes. Students must pass all required department lecture and laboratory courses for the baccalaureate degree with a grade of C or better.
3	Demonstrate an ability to work effectively independently and cooperatively.	Individual and group projects are incorporated into the department's curriculum. Students must pass all required department lecture and laboratory courses for the baccalaureate degree with a grade of C or better.
4	Pursue career objectives that make use of the baccalaureate degree.	Students who successfully complete the baccalaureate degree will seek admission into graduate programs, professional schools, teacher credential programs, and/or seek work as professional scientists.

C. Are the Assessment Strategies/Measures of the Program Changing Over Time?

Over the last few years, we have moved to make assessment more systematic and specific, by developing the assessment strategies and approaches indicated above and developing guidelines for the capstone experience of our undergraduate majors, with rubrics already developed (by Koch and Wan) for some of our undergraduate student support programs funded by the National Institutes of Health (IMSD, MARC). Thus, we expect our students graduating with a bachelor's degree to have (a) given oral research presentations to their research group (usually using Power Point); (b) given a research poster presentation to faculty and students outside the research group; (c) prepared a substantive research report [495/499/490(internship) report] that is evaluated not just by the mentor but also by other faculty. Most of this has been ongoing for some time, but it has now become more formalized; and it will be more formally assessed.

D. Modifications to Enhance Student Learning

We have been trying various kinds of new approaches to meet the challenges of enhancing student learning despite students entering our programs with poorer preparation. Among those we have tried that we think are helping are:

(a) Testing all students entering our general chemistry course 120A (necessary not only for our majors but for other science and engineering majors) for basic chemistry proficiency, using an American Chemical Society standardized examination, which is now given also by the university testing center. Those not making a threshold percentile grade must take Chem 115, which introduces or re-acquaints them with basic chemistry principles. Students have had to test into 120A for some time, but now the testing center is also involved, and entry into a new course (Chem 200, for nursing students) requires the same pre-testing.

(b) Since the last PPR, the ability of students to enter courses without prior advisement by a faculty member has been tightened. Continuing students are only permitted to enroll after they have been advised – which occurs in the middle of every semester, after which they can register for classes in the next semester. This is the policy for the College of NSM as whole, and the College has been extending this required advising to all new entering students, including transfer students. In addition, the College of NSM as a whole is emphasizing and promoting particular issues relating to student success, namely (i) hours of study required per course per week; (ii) realistic course loads, based on performance and particularly if a student is also working; (ii) making sure courses are taken in the best sequence and prerequisites are in place.

(c) We are increasingly using a computer-integrated curriculum, with lots of practice in understanding and applying chemistry concepts, being aware of the reality that today's digital generation of students communicates and learns differently than in the past, and that our delivery of material must adapt.

(d) Despite administrative resistance (prior to this year), we have added one unit workshops to specific courses, such as organic chemistry (301W) and analytical chemistry (315W), which have proven beneficial to the students enrolled (those with poor grades rising to average grades of one half to one unit higher compared to the rest of the class). These had to be cut during the current budget crisis but will be reinstated as soon as possible. Currently, Title V and STEM grant funds are being used to support recitation workshops (run by more advanced students) in support of the first semester general chemistry (120A), and organic chemistry (301A) courses, and this has proven popular with the students. We hope this kind of support can continue as well.

(e) The department has made it a priority to better integrate the undergraduate curriculum, to ensure that the major concepts, attitudes, skills and processes needed for success - not just in the lower classes but in those that build upon them, are better emphasized and reinforced throughout the curriculum. A faculty retreat for this purpose has been scheduled. (We hope such an effort will work to reduce the need for students to retake classes.)

(f) The department has prioritized the need to enforce pre-requisites, using the new CMS system, and to discuss other means to enhance student success, particularly in beginning and mid-level courses.

E. Assessment of Student Learning in Online Coursework

We have just begun to offer a limited set of mixed online/off-line courses (210, 410A and 410B), which are courses centered on use of computational tools in chemistry and biochemistry. The latter courses constitute upper division courses in the biochemistry and chemistry track, respectively, while the lower division 210 is required of both chemistry and biochemistry majors. Success in these courses is assessed by pre- and post-course surveys that examine ratings of self-efficacy and accomplishment of learning outcomes. A summary of recent data surveying students before and after taking 210 may be found in Appendix III, B, and shows that most students felt they emerged from the course with greatly increased knowledge of the use of computational tools. As we develop further online courses, we will develop appropriate assessment strategies, along the lines of those we have described for our other courses (see B, above).

IV. Faculty

A. Changes in Tenured/Tenure Track Faculty

Since the last program review, 7 faculty retired (Olmsted, Willis, Hiegel, Thomas, Belloli, Wegner, Weber), most going through some years of the Faculty Early Retirement Program (FERP), which involved teaching half time all year, or full time one semester. During the same period, 8 new tenure track faculty were hired (Srinivasan, Li, Monteyne, Stoddard, Hyland, Hudson, Rasche, Sorasaenee). FTEF allocations went from 20.4 in 2001-2002, to 23.8 in 2007-2008 (still current), the increases being due to the large increase in FTES our department has been serving (about 60% since 2002; see earlier). In 2002, we had 18 tenured and tenure track faculty, of whom two (11%) were Assistant Professors (de Lijser and Gonzalez), five (28%) Associate Professors (Rogers, Hewitt, Meyer, Tao, Thomas), and 9 (50%) Full Professors (Olmsted, Belloli, Weber, Wegner, Hiegel, Linder, Deming, Kantardjieff, Goode). Our FTEF allocation was 20.4, with 88% of those positions occupied by tenured/tenure track faculty. This has changed dramatically. This year we had 23.8 positions and the same number of TT faculty (76% of positions). However, seven (39%) were untenured; four (22%) Associate Professors (three promoted since the last review); and seven (39%) Full Professors (three promoted since the last review). [It should be noted that we were fortunate to hire one Full Professor, without tenure (Madeline Rasche) from the University of Florida (a PhD granting institution), to shore up the ranks of mid level faculty that can be groomed for future leadership within the department.] We are thus “growing” a lot of new faculty, new hires having joined our department one every year, since the last review. To help us cover our teaching obligations, we were given permission to hire an additional faculty member already last year (to being Fall, 2008). The initial search, and this year’s continuing search option were aborted, in view of the budget crisis. We also hired a Full Time Lecturer in general and organic chemistry (Ow; now in his second year), which has made a difference to the staffing and stability of these courses. Unfortunately, we are losing two of our untenured faculty (Monteyne and Stoddard). One is leaving for a more rural and less expensive environment; the other had serious family issues that impelled him to leave the area. This leaves us with 16 TT faculty for Fall, 2009 (16/29.2, or 55% of positions). We expect to be conducting a search for one replacement tenure track faculty member in the Fall, and will need to retain part time faculty (and hopefully also recruit a Full Time Lecturer) to help us cover our teaching obligations.

One consequence of all these retirements and changes in department faculty is that the availability of mid level and senior faculty to take on department leadership roles became more difficult. At times, we have only had just enough to staff our Department Personnel Committee (an elected committee) and the chair. To keep the department going, a unique arrangement was vetted by the Dean and university, and voted in by the department, to have Maria Linder (who did not want to give up her research) pair with one of our full time lecturers, Mark Filowitz (a physical chemist and former oil company CEO) to lead the department. They went "into training" for this in 2003-2004, and took over when Robert Belloli retired at the end of that year. Mark, as vice chair, ran the day to day operations (advising, scheduling, budgets) and was in charge of staff; Maria was in charge of faculty tenure and promotion activities; both shared other responsibilities, such as liaison with the upper administration and dealing with other department and college issues. This came to an end just before the start of the current academic year, when Mark Filowitz took the position of Associate Dean of our college. Loss of his leadership has resulted in a much heavier administrative burden on Maria Linder and other faculty, Richard Deming (the new vice chair) taking on a great deal but not nearly as much as Mark Filowitz. Several of our senior faculty have also taken on part time or almost full time university-wide or external responsibilities. [Scott Hewitt is chair of the faculty senate; Christina Goode directs the Health Professions Advisement office; Katherine Kantardjieff has significant obligations for web-related workshops and faculty support in the Faculty Development Center; Peter de Lisjer has some obligations in the Office for Graduate Programs and Research; and Christopher Meyer is currently a program officer at the National Science Foundation, returning this August.] Adding to department difficulties and stress were the retirement of all three of our secretaries in the department office in the winter and spring of 2008 (two of them after 15-20 years of service), and the loss of one long-time highly regarded part time lecturer (Leslie Gillespie), who died midway during our spring semester, this year. All of this, plus the budget crisis (which has put greater pressure on all faculty to take on more teaching), and the fact that we are also losing the two tenure track faculty already mentioned (Monteyne and Stoddard) has been discouraging, raising the level of anxiety within the department and affecting morale. Indeed, the last year has brought a truly unprecedented conjunction of challenging events, considering which it is rather amazing that we are meeting our obligations as well as we are!

B. Faculty Hiring Priorities

Starting with our series of retreats after the last PPR and annually since, we have reviewed our hiring plans and made 5-year projections. During the period under review, one of the commitments made by the department was to develop a cluster of chemistry education researchers. Barbara Gonzalez was the first of our hires (coming in 1999) doing research in this area, and joined Patrick Wegner (since retired), who had been developing computational chemistry teaching tools. Before he retired, Kereen Monteyne (PhD in physical chemistry and chemistry education) was hired in 2004; and the department prioritized hiring an additional chemistry education research faculty member, for which we obtained permission in Spring, 2007. Several candidates were interviewed and an offer made to the top candidate (refused), just as the budget crisis hit. That search and the one initially scheduled for the current academic year were aborted primarily because of budget uncertainties. The department has a real interest in resuming such a search when it seems this is likely to succeed. This would be in line with the Dean of NSM's interest in expanding the training of teachers in mathematics and the sciences at the master's level, through a new Center for Advancement of Teaching and Learning in Mathematics and Science (CATLMAS), the first year of which is funded by an earmark grant from the Federal Government. We see this as helping to meet the dire needs of our K-12 school systems to provide a strong educational foundation for developing future scientists and mathematicians at the local and national level. Another priority of our faculty is the development of more interdisciplinary courses and interdisciplinary research collaborations. With this in mind, we have kept an eye on ways in which applicants for our faculty positions might interact with other faculty in mutually beneficial ways, either in research and/or developing interdisciplinary courses.

To staff our courses, we have needs in most areas of chemistry. The outcome of our hiring plan review in June, 2008 was to first go for someone in chemistry education, and then someone in biochemistry or chemical biology (the latter of whom often teach organic chemistry). Since we are now losing one of our organic chemists and one of our chemistry education faculty, the new priorities (just reviewed again) are to search for one (and not two) additional tenure track faculty in 2009-2010, and make this an open search emphasizing our needs to cover teaching in general, analytical and organic chemistry, but being open with regard to research interests. Depending upon the interests of those who apply, individuals will be able to carry teaching responsibilities in one or more of the chemistry sub-disciplines, and that can and will influence future plans. A current concept is that future hires of interest to us could be active in more than one sub-discipline of chemistry. Thus, not only chemistry education researchers, but organic chemists, analytical chemists or physical chemists might have cross-disciplinary research in areas related to biochemistry, or vice versa, and so on. Other considerations are that (a) our current vice chair (an analytical chemist) will enter the early retirement program in Fall, 2010; (b) we are in the process of thoroughly revising and reconsidering our Department Personnel Standards, which may influence how applicants feel about joining our department; (c) beyond replacing the two faculty just leaving, and perhaps an additional faculty member in chemistry education, we would not have the facilities to house additional faculty research laboratories, without expensive renovations of existing space or the construction of new facilities; (d) it is unlikely that we will have the levels of startup funds (now in the $200k range for our kind of institution) needed to ensure success in hiring individuals with research in many of the chemistry sub-disciplines of interest to us. In the interim, and considering the current economic climate, the department would like to hire more full time lecturers.

C. Roles of Full Time and Part Time Faculty and Student Assistants in Academic Offerings

In general, our full time faculty are involved in teaching all levels of the curriculum, including large and small beginning, mid level, senior level and graduate lecture and laboratory courses. Because the numbers of students we are teaching has grown 60%, and the number of full time faculty has remained the same (or actually diminished, since several of them have obligations outside the department - such as Chair of the Faculty Senate, head of the Health Professions Office, IT Consultant for the Faculty Development Center; Program Director at the NSF), we have had to hire more part time faculty than before to cover our courses. In 2003-04 we had 5 part time faculty (Appendix IV, Table 9). Currently we have 14 part time faculty teaching 100-300 level courses and laboratories (61.2 WTUs); teaching assistants (mostly graduate students) are covering 57.2 WTUs; and full time faculty the rest (266.5 WTUs). The latter includes units devoted to supervising undergraduate and graduate students in research courses (Chem 295, 395 and 495 or 499 or 490) required for undergraduate degrees, or for the Master's degree (Chem 599, 598 or 590). Our faculty are supposed to receive 0.33 units of credit for every unit (6 hours per week) of undergraduate research supervision, and 0.50 units of credit for every Master's student. While we are proud of this "institutionalization" of research credit, for which faculty are also given a modest supply budget per unit of student research, in practice, and particularly in these times of budget constraints, recording and forwarding to the upper administration the full measure of these efforts (in terms of WTUs) has been considered problematic, and has not regularly occurred, in that virtually all of our faculty would be credited with having a high work overload. We plan to work with the administration to bring about permanent and full recognition for this important part of our teaching and mentoring activities.

In general, the part time faculty have been PhDs, or have Master's degrees (often from our own department), and have been hired to teach general education courses (111, 100, 311) as well as most of the activities and/or laboratories associated with the general chemistry (115, 120A and B) and organic chemistry (302) curriculum. Our graduate students (and occasionally some of our outstanding undergraduates) have been a major resource for teaching the lower level laboratories and activities and sometimes also 302 (core organic) laboratories, and the activities associated with the general chemistry curriculum. They have also been assistants in some of the complex upper division laboratories, where enrollments have been at a maximum (but limited to 16 or 24 students for space and safety reasons), such as the core biochemistry laboratory (422) and sometimes also the analytical lab course, as well as in some instrumentation modules (411 courses). They also help with grading assignments and tests in large enrollment courses. At present, under budget constraints, we are employing 17 graduate students and 2 undergraduates as part time instructors (1), teaching assistants (16) and graduate assistants (2).

D. Instructor Participation in Special Sessions Self-Support Programs

(Not applicable)

V. Student Support and Advising

A. How we Advise our Majors, Minors and Graduate Students

All undergraduates are notified by Email and postings about the need to see a specific faculty member for advisement at the start of the second half of each semester. Advised students are permitted to register through a faculty-signed form brought to one of our department secretaries. Students who fail to obtain advisement during the three week designated periods are advised by the vice chair or chair, in the chemistry office. Incoming freshman and transfer students are advised either during college orientations or in the chemistry office (mostly by the vice chair or chair). Students doing the chemistry minor are generally advised by the vice chair in the chemistry office. During advisement, specific forms (listing all requirements) are filled in, and plans are made for the next semester(s), the forms being signed by both student and faculty advisor, and the student retaining one copy, the other going into the student's file. Graduate students are advised every semester, mostly by the Graduate Advisor but also by the research advisors. For graduate students who have begun their thesis research, the form comprises a Study Plan, which is vetted with the research advisor. Graduate student progress is evaluated every semester and students with problems are counseled about how to proceed and about their options, both personally and in writing, with copies going to the faculty mentors. The Graduate Committee also reviews problems and gives feedback to the Graduate Advisor on how to proceed. As mentioned earlier, undergraduate students are counseled particularly on the importance of sufficient study time, integrating outside work and their academics, and taking courses in the most efficient sequence, and with pre-requisites.

B. Student Opportunities to Participate in Research, Internships, Service Learning, Honors

Doing research with faculty is integral to all our current degree programs. Undergraduates are required to carry out at least 2 (BA chemistry) or 3 (BS Chem or Biochemistry) units of senior, independent laboratory (Chem 495) or library (Chem 499) research for their degrees, but at least half do considerably more and start earlier (Chem 295, 395), spending 2 or more years with a given faculty member. This is the major capstone experience for our undergraduates. Probably about 5% of our undergraduates opt for the library versus laboratory-based research experience (499 versus 495). A much smaller percentage (1-2%) do research as interns (Chem 490), mainly in laboratories associated with local companies. These interns must meet the same requirements as those of the 495 students, and they have a department faculty liaison and mentor who sees to that. Our Master's degree (MS Chem) requires a research-based thesis (or project) and enrollment in Chem 599 and 598. All the research activities are supported by (i) research funds obtained by individual faculty through extramural and intramural grants; (ii) funds from federal (NIH, NSF) and private (Howard Hughes Medical Institute) grants supporting students doing research (rather than working to support themselves), during the school year and also during summers; (iii) up to $3750 per year per faculty member from department funds ($150 per student per research unit per semester); (iv) WTU from the department (0.33 units per undergraduate, 0.5 units per graduate student, for up to 3.0 units per semester) for the degree coursework in research they are providing (Chem 295, 395, 495, 499, 490, 599, 598), as already indicated. Virtually all the faculty are participating in these student-faculty research activities to some degree.

From this information, it should be apparent that the Department has a well-established research "culture" that involves all our undergraduate majors, as well as our graduate students, in research. We are proud of this culture and know that it provides our undergraduates advantages with regard to obtaining technical jobs in industry (and at other institutions), and entering graduate or professional training programs. Our graduates (with bachelor's or Master's degrees) are a significant portion of the technical workforce in the local pharmaceutical, biotech and other industries. In our Master's program, we have a particularly good track record in developing (or rehabilitating) bright but disadvantaged students who either did not perform so well as undergraduates, or had not yet figured out the nature of their life and career interests upon completing their bachelor's degrees. Those of our students who obtain Master's degrees do very well not only in industry positions but in rigorous doctoral and professional programs. The same is true of many of our undergraduates.

Aspects of our research culture that stimulate the interest of our students in the practice of chemistry and biochemistry include not just the fact that they must take research courses requiring them to apprentice with faculty on research projects (theoretical or actual) as part of their requirements for the undergraduate (or graduate) degree, but also that research and scholarly activities are a constant thing in our department, some students and faculty being in their laboratories almost all the time, including evenings and sometimes at night, year round, on weekends and during the week, whether or not classes are in session – as is the case at "Research-1" institutions. Adding to that, and making it more likely and robust, are our strong summer research and student research support programs, which include financial support for students engaging in research, year round (MARC, LSAMP, and Howard Hughes Medical Institute grant programs) and during the summer (REU, International REU, HHMI, and others) (see Appendix V). We (with Biology) lost our long-standing IMSD and Bridges to the Doctorate programs in 2006 and 2007 (supported by NIH), but will be re-applying for the latter and are currently applying for a Bridges to the Baccalaureate grant (also from NIH). These grants do a great deal to stimulate our students to immerse themselves in practicing and learning chemistry and biochemistry, allowing them to be paid to do this rather than having to work elsewhere in non-science jobs; also providing research "manpower" (and a little money for supplies) to the faculty. Almost all publications from the department are based on student work and have students as co-authors. The same is the case for conference presentations. Moreover, many of the undergraduate and graduate students (irrespective of whether they are receiving financial support from some of the indicated grants) attend local, regional, national and even international conferences, to present their work along with the faculty involved. Thus, over the last 7 years, the faculty we currently have (and while at CSUF) with their students have published more than 90 peer-reviewed articles with student co-authors (Appendix VIII); and the students (with their mentors) have made more than 200 research presentations at regional, national and international meetings, and uncountable numbers (literally hundreds) of research presentations at local and CSU-wide conferences.

It is also noteworthy that many of our faculty have received internal as well as external awards recognizing them as outstanding teachers, outstanding researchers, or rendering outstanding service (see Appendix VIII). Thus since the last PPR, Katherine Kantardieff was recognized by the College of NSM for outstanding teaching; Fu-Ming Tao and Christopher Meyer for outstanding research; Peter deLijser and Christina Goode for promoting student success; Chandra Srinivasan for being the outstanding untenured faculty member. In addition, Christopher Meyer and just now also Katherine Kantardjieff, were selected for the Distinguished Faculty Member Award of the College, and Katherine Kantardjieff for the Andreoli Outstanding Service Award from CSUPERB (CSU program for education and research in biotechnology). In addition, Maria Linder was given the CSU-wide Wang Family Excellence Award in 2007, that recognizes a member of the CSU faculty for outstanding contributions in the natural sciences, mathematics and engineering (one of ten, over ten years).

VI. Resources and Facilities

A. Itemize State Support and Non-State Resources Over Last Five Years

As shown in Table 10 (Appendix V), overall state-derived revenues to support all aspects of our teaching responsibilities have increased about 20% in the last 5 years, also increasing slightly last year. Significant contributions have been revenues for increased enrollments in our courses (increased FTES) (see "Additional baseline"), as well as increases in our funds for part time faculty, teaching assistants, and graduate assistants ("PT blanket"). While these revenues (plus faculty and staff salaries) have been adequate to cover the staffing of our courses, the funds made available for support and maintenance of our extensive IT and laboratory infrastructure have been thoroughly inadequate (OE&E). Typically over the last several years we have been using $150,000 or more from other sources (the PT blanket or various carryover funds) to cover those costs. While the allocations for replacement of computers and other equipment have been very helpful (Equip/Computer), most of our major equipment is aging, and the level of funding available from the university is only a stopgap (see section B, below).

The major non-state resources of the department that support the education of our undergraduate and Master's students, as well as the education of some students from other colleges and universities (as well as some high school students and teachers) come in the form of grants, mainly from federal agencies, obtained by our faculty (a) in support of students to carry out research and promote them entering chemical and biomedical research careers; (b) in support of the individual or collaborative research of our faculty; and (c) to obtain costly research-grade instruments to use in faculty/student research and in instrumentation courses (Appendix V).

B. Identify Special Facilities/Equipment and Plans

The department has numerous teaching laboratories to accommodate large numbers of sections of its laboratory courses in general, organic, biochemistry, and nursing chemistry. Each research-active faculty member (which is almost everyone) also has a research laboratory in which undergraduate and graduate students, as well as some post doctoral fellows and research associates/technicians carry out research. Many of these research laboratories contain highly sophisticated and specialized equipment that was either constructed from parts or directly purchased, with funds obtained through grants or startup funds (new faculty), or imported from elsewhere when the faculty member came to CSUF.

We have two special pieces of equipment that were obtained through NSF instrumentation grants over the last few years, and for which renovations were needed to house them in the basement of McCarthy Hall: a 400 mHz NMR from Bruker particularly essential to our organic chemists; and a research grade, EMX*plus* EPR spectrometer (Bruker-Biospin) that allows UV-Vis spectroscopy while simultaneously observing magnetic resonance behavior. Acquiring the NMR instrument was critical for us to hire the two new organic chemists who replaced two that were retiring (Gene Hiegel and Bob Belloli). [We are grateful that the NSM Dean worked out a contingency agreement to obtain funding for the NMR in case our NSF proposal was unsuccessful (one third from the VPAA, one third from the Auxiliary Services Corporation, and one third from the Department), which did not have to be invoked.] The NMR and EPR are fundamental to the research of several faculty and some of our classes (411 and 306B). Currently, we have plans to take advantage of federal stimulus funds made available through the NSF to apply through the MRI program for a Dispersive Raman Spectrometer (Thermo-Nicolet Almega XR, with accessories) to study the microscopic structures of materials and glean chemical structure information non-invasively and without destroying samples; and through the CCLI program for an oxygen bomb calorimeter and FTIR spectrometer (Nicolet 6700; with NXR FT-Raman accessory module) and computers with GausView software, to refurbish and upgrade our physical chemistry laboratory course (355).

Since the last PPR, some of our faculty joined with some in biology to obtain an excellent confocal microscope, which has been beneficial. Several of our faculty (and some in Geology) have a need for AE or ICP-MS instrumentation to measure trace quantities of minerals and trace elements. [We currently only have graphite furnace atomic absorption for those purposes, which is not suitable for most of our modern-day work, and must collaborate with Cal State Long Beach for the ICP-MS.] Upgrading our fluorimeters to allow transient and steady-state analyses would also be beneficial to at least two of our faculty. Plans are also underway to obtain a new HPLC system for biochemistry.

Since the state does not provide more than a fraction of the funds needed to keep our course and research laboratory facilities going (and much less than normal in these times of budget crisis), we will make additional concrete efforts to submit additional grant proposals to NSF (and probably also NIH) for groups of "workhorse" instruments that are getting quite old, and for which replacement parts may be difficult to obtain in the future. These include a nanopure water system (although really part of our infrastructure that should be refurbished by the university), gamma counter, ultracentrifuge and rotors, and a new gel documentation system for biochemistry, as well as gas chromatography-mass spectrometry systems, and atomic absorption, UV-Vis, and IR spectrometers, and GC-FID instruments for the analytical (and biochemistry) laboratories. As already indicated, the physical chemistry laboratory course (Chem

355) has been revamped by Zhuangjie Li, and a new suite of updated instruments will be needed there, for which he is applying to NSF.

Special facilities include our studio classrooms (MH 587/536), which are centers for teaching the beginning chemistry courses and associated activity sessions. These were already set up at the time of the last PPR. However, the computers (48 in each of the two adjacent rooms) as well as the sound system and carpets had to be upgraded and replaced, and this will again be necessary in the foreseeable future. The computer classroom (MH 501) for teaching the computational courses required by our majors (210, and 410A, B and C) will also need to be upgraded. Keeping the infrastructure for these computer classrooms up to date is a priority, and costly, for obvious reasons. Particularly as we will only be adding (and not subtracting) computational aspects to our curriculum, this will remain a priority. At great cost, we converted MH 564 (previously our physical chemistry laboratory) into a showcase laboratory for the Chem/Phys 102 course that trains future science teachers.

The Keck Center for Molecular Structure (CMolS), under the direction of Katherine Kantardjieff, housed in our department in the basement of McCarthy Hall, continues to serve not just our own department and university but also other CSU campuses by providing means to obtain the X-ray structures of smaller molecules and the means to obtain larger (protein) structures through connections with the Stanford University synchrotron. The first research facility of its kind at a PUI, CMolS is a CSUPERB core facility dedicated to structure determination and analysis using X-ray diffraction. CMolS provides diffractometers for small molecule and macromolecular crystallography, as well as basic powder diffraction analysis. CMolS also provides high-end computational facilities for modeling and refinement, virtual screening, quantum mechanical and molecular dynamics calculations. Crystallization screening and diagnostics capabilities include commercial screening systems, static and dynamic light scattering, and stereo microscopes with crossed polarizers and digital imaging. In 2005 CMolS became a core node in the nationwide consortium, the STaRBURSTT-CDC[1]. Katherine Kantardjieff's reputation resulted in CMolS being selected in 2006 as a showcase laboratory for Oxford Diffraction Systems, receiving $450K of instrumentation. In 2008 and 2009 CMolS received funding from Boeing ($58K) to support *PRISSM*[2], harnessing the power of end-to-end cyber-infrastructure to bring together a variety of sophisticated instruments in the CSU. Building on existing programs and expertise, *PRISSM* provides students, college/university faculty, and secondary classrooms with real-time remote access and control of specialized scientific instruments from remote locations, together with real-time discourse.

C. Library Resources and Plans

Current library resources are relatively adequate. This is because the university and librarians have used their resources to make as much of the research literature (mostly in journals) available online, and because we made arrangements with the library to subscribe to SciFinderScholar program (from the American Chemical Society), an essential tool for several of our new faculty and their students. We have had to pay about $11,500 per year for the latter, but agree that this is a priority; and we will be

[1] Science Teaching and Research Brings Undergraduate Research Strengths Through Technology – Cyber Diffraction Consortium
[2] Partnership for Remote Instruments to Study the Structure of Matter

looking for ways to have this become a baseline budget item, as it is essential for the education of our students in chemistry. In the coming months we will switch from the program-based to the web-based version of this tool.

VII. Long Term Plans

A. Summary of Long Term Plans

Our long term plans are to work towards accomplishing and living up to our core values, explained in our Long Range Plan (Appendix X) and crystallized in our vision Statement (Part I.A, above), as well as the prioritized goals summarized in Part I.B, bearing in mind the need to reconsider these priorities regularly, as conditions and circumstances change (funding, student needs, changes in the professions of chemistry and biochemistry).

Summarizing our long-range plans more specifically, they are to:

- Develop and regularly revisit a 10 year strategic plan for the department as a whole, including (a) the maintenance and updating of our equipment and computer infrastructure, and (b) developing new laboratories to house additional research faculty and laboratory courses
- Write grant proposals to replace aging infrastructural instrumentation and equipment, and push the university administration and CSU system to recognize the need to incorporate into our budgets funding to service and maintain this aspect of our infrastructure (technical support positions and maintenance funds)
- Lobby for construction or renovation to produce and accommodate space for additional laboratory courses and for additional faculty research. (If renovation is the route, consider building new Chem 120A/200 laboratories on the 5^{th} or 6^{th} floor of MH, and renovating the DBH 120A/200 labs to make new faculty research laboratories)
- Integrate and regularly review our undergraduate curriculum from one level to another and across all levels, using our developed programmatic student learning outcomes as a guide
- Develop some new, truly interdisciplinary courses, potentially taught by teams of faculty from more than one department, that deal with newly emerging areas related to chemistry and biochemistry; “green” and microscale them where possible and appropriate
- Revise and rethink our Department Personnel Standards, considering whether and how to allow more flexibility in meeting standards set by the department, in view of (a) the current financial climate for outside funding, (b) increased teaching loads, and (c) taking into account standards and approaches used in comparable CSU departments, as well as the department’s commitment to chemistry education research
- Develop new or revise existing degree programs according to the needs of our students, our disciplines, the workforce, and graduate programs
- Implement guidelines for, and assess the quality of, the “capstone” research experiences (in lab, library, or internships) required of our majors under the current UG degrees and future applied degrees

- Continue to mentor and provide adequate support for the development and success of our new faculty – part time and full time (already on board and still to come), and continue to annually review our faculty hiring plans
- Gather and periodically evaluate assessment information on the quality of our degree programs and success of our students entering the workforce or post graduate education programs
- Assess the impact and success of the expected new Applied Master's degree (MA Chemistry)
- Find new ways to minimize student attrition and maximize students successfully completing our courses
- Develop appropriate online courses and training programs
- Expand course offerings to the Irvine campus
- Continue to develop closer ties with local industry (where we are already active in biotechnology), local universities and other institutions, for collaborative ventures in student training and research instrumentation

Concerning assessments, we have already defined our goals and strategies for the curricular aspects of our work in the tables of Part III.B (above). The goals and assessments for the teaching, scholarly and service activities of our faculty are described in our Department Personnel Standards, which are currently being revised. Additional measures of the success of our programs are:
(a) the number of presentations of student-faculty collaborative work at local, regional, national and international conferences;
(b) publications with student co-authors in peer reviewed journals and as published conference presentations (including abstracts);
(c) the success of our faculty as a whole in obtaining all kinds of grants from external (as well as internal) sources, including grants for specific research projects, specific instruments or groups of instruments, and for student support programs that enhance student learning, teacher training, and/or faculty research productivity.

Appendix V, Table 10 provides information related to state and non-state funding resources obtained over the past 5 years, including for programmatic support of students carrying out undergraduate (and graduate) research. Appendix VIII tables show data on total publications and national or international conference presentations made by faculty and their students over the last 5 years, as well as external grant support to individual faculty for their research. The results are impressive. A substantial number of grants provide wages and stipends to students allowing them to do research in place of taking non-science jobs to support themselves. Most of our faculty, including those on the tenure track, have or have had significant external grant support, starting with starter grants from Research Corporation, and going on to NSF RUI grants in chemistry as well as biochemistry, and NIH grants (AREA and RO1). Over the last 7 years, our current faculty have published more than 90 articles while at CSUF, mostly in peer-reviewed journals and with student co-authors, and they and their students have made more than 240 presentations at regional, national and international conferences, as well as hundreds of presentations (too many to list) at local and CSU-wide meetings.

B. How Plans Implement University Missions and Goals

The long term priorities listed above mesh perfectly with most of the Missions and Goals of our university, particularly goals I a,b,e,f,g, (including promoting the preeminence of learning by integrating teaching, scholarly and creative activities and the exchange of ideas into our curriculum and student experience; integrating advances in information technology; recruiting highly qualified faculty and staff); II a,b (supporting undergraduate and graduate programs in professional and pre-professional studies in chemistry, biochemistry and related disciplines; providing opportunities to learn through internships and other off campus activities); III a,b,c,d,e (promoting a culture and personnel document supportive of research and the involvement of students in faculty research); V b,f,g (providing a safe environment, friendly to diversity, with opportunities to support disadvantaged students in research activities by defraying their costs with financial support from extramural sources); VI c (encourage faculty to obtain extramural grants in support of curricular and scholarly department activities). [University Missions and Goals are listed in Appendix IX.]

C. Evidence and Analysis of Results

The department has developed goals (and strategies) with regard to student learning, scholarship, and service, along with criteria for their assessment. What was developed and presented in the tables of Section III.B (above) indicates how we defined and will analyze the academic work and achievements of our students. Our document of Department Personnel Standards (which we are currently reviewing and revising in response to changes in university guidelines and issues raised by our faculty) defines how the performance of tenured/tenure track faculty is to be evaluated in terms of teaching, research/scholarly activity and service, and how new faculty are to be mentored to help them achieve tenure. We also have guidelines for the evaluation and support of Full Time Lecturers, and Part Time Lecturers. For our students and the tenured/tenure track faculty, it is clear that research and scholarly activities in chemistry and biochemistry are a significant component for measuring student learning outcomes, as well as for evaluating progress towards tenure or promotion.

In general, the department sees research and scholarly activity (on the part of students and faculty) as integral to the disciplines of chemistry and biochemistry; hence their inclusion in our degree programs. Practical experience in the laboratory (whether “wet” or computational) or reviewing research results in the library, is part of what chemists and biochemists do in the workplace. We thus see our degree programs as providing graduates better trained in their discipline than is the case for most other kinds of colleges and universities. It gives them an edge in acquiring jobs in various industries and also in applying to graduate and professional programs, which value this kind of background. We are supplying many of the technical personnel to local industries that require a chemistry or biochemistry background. Those students interested in obtaining a PhD in chemistry or biochemistry are generally successful in doing so, and many of them enter and complete programs at prestigious institutions. Many also enter professional programs in various health sciences (from medicine to pharmacy). One of our major successes is that of giving students with an uncertain or non-stellar undergraduate background, or who were not able to decide upon a career requiring further education, a chance to prove themselves in our graduate program, and in doing so, become eligible and sought after for entry into doctoral and professional programs.

The kinds of evidence to be collected and analyzed to measure our Department's results in pursuit of its goals include:

(a) data showing that fewer of our undergraduates repeat courses; that more take 6 years or less to complete the degree; and that the grade point averages of our graduating bachelor's students show some improvement over the next years; [We will also be scoring them on specific culminating (capstone) activities required for the degree, and hope to see a gradual upward trend.]

(b) the success of our new faculty in obtaining tenure and promotion;

(c) the activities of our faculty in terms of maintaining or increasing publications and awards relating to teaching performance and/or teaching research;

(d) the activities of our faculty in scholarly and creative activities, as evidenced by numbers of publications in peer reviewed journals, other publications (including books, reviews), numbers of grants from external agencies supplying research funds, maintaining or increasing the numbers of presentations at national and international meetings;

(e) evidence for the involvement of the same or increasing numbers of students in these activities, and numbers of student co-authored publications and conference presentations;

(f) evidence of successful efforts to obtain external funding in support of student learning, through continued of increased funding of such programs as REU, MARC, the Howard Hughes Medical Institute supported Research Scholars program, Louis Stokes Alliance for Minority Participation, or the Noyce program for future teachers; and

(g) evidence of continued numbers of successful efforts to obtain instrumentation infrastructure and single or multiuse research instrumentation grants.

D. Long Term Budget Plan to Support Goals and Strategies

In the current budget crisis, it is difficult to predict whether and how we can adequately support our goals and strategies and how things will be worked out both short term and long term. We do know that we have been through such crises before, although the magnitude of the current one may be more severe.

As concerns funding from the university and CSU, our most difficult problem has been that the budgets for operations and equipment (OE&E) have for many years been far too low to support our equipment and infrastructure needs. Thus, we have been using funds we get for hiring part time faculty, teaching assistants and graduate assistants to cover those costs. Until this year, there have been annual infusions of limited funds in support of replacing and updating equipment (instruments and computers). However, overall, our instruments, computers and infrastructure for laboratory courses and common research equipment are well along in age, many coming to the point where spare parts are no longer available, and/or current software programs cannot run. The last time we had a big infusion of funding for infrastructure was when we obtained the new laboratory building (Dan Black Hall) in 1993-1994. We augmented the impact of that funding by using it partly as matches for instrumentation for which we applied to granting agencies such as NSF. Most of that major equipment is still in use but aging. The CSU system does not, and never has given us adequate support to replace and update our infrastructure. The Dean and department will continue to lobby to change that.

More staffing is also badly needed, not only to help maintain and repair our instruments and computers needed for our laboratory and required research courses, but also to support faculty in utilizing specialized equipment - such as the NMR, EPR, and confocal microscope. (It should be noted that The Department of Biological Science has a staff person devoted to running the microscopy facilities. We have never had this kind of a staff member. We have increased our FTES 60%, but we have the same number of support staff – only one instrumentation technician, and one IT person.) Otherwise, our main strategy must be to continue to identify and prioritize our infrastructure needs and apply to specific funding agencies for support, while continuing to lobby the university and CSU system for help. We will also keep our eyes open and seek for donations of equipment, equipment that is in working order and truly needed in our laboratories.

In the current climate, it is harder for faculty to obtain funding for their individual research, and yet they are training students in their laboratories and this is very expensive. The department needs to be able to devote more state resources to supporting this expensive student laboratory training. This is particularly the case with students doing Master's degree research, which is often more extensive and sophisticated, requiring more financial support.

We cannot hire new "wet" research-active faculty, without adequate startup funds that are competitive, so candidates will consider coming to us rather than going elsewhere. (Even local CSUs have been offering better startup packages.) The VPAA has acknowledged some of this by (wonderfully) giving us funds up to $95,000 for such new faculty in the last few years. However, this level of startup support is no longer enough for most kinds of new hires doing "wet" chemistry.

VIII. Summary of Strengths and Weaknesses

In summary, we have a great many strengths, but also major problems. Among the strengths are (a) the robust and expanding enrollments in our courses and programs, at the undergraduate and Master's level; (b) effective teaching and mentoring of our students, as evidenced by the results of Student Opinion Questionnaires (SOQs) of our faculty, the mandated direct interaction of students with faculty in research, and the abilities of our students to enter rigorous graduate and professional programs as well as excellent technical jobs in the workforce; (c) success in continuing to obtain substantial grants in support of student involvement in research and training in practicing and explaining chemistry and biochemistry; (d) the productivity of our faculty with regard to scholarly and creative activities, and other involvements in their professions; (e) the service of our faculty to the department, college, university and local and professional communities.

On the down side is that we are undergoing a great deal of change, which requires adjustments, and brings uncertainties as well as the need for reassessments and reworking of many of our fundamentals, and the rethinking of our directions, priorities and goals not just once in a while, but much more frequently. The faculty are stretched too thin (there are more students per faculty member, less prepared students, more classes to teach per faculty member, more department committees to be on, etc.). There are concerns about where our future leadership will come from, about our aging infrastructure and equipment, and how the equipment in support of our teaching responsibilities can be maintained and upgraded when OE&E funding is completely unrealistic.

Despite our problems, there is a willingness to work together and find ways to go forward, based on the successes and promises of what we have that is working well, and identifying what is not and why. We have had an unprecedented year of difficulties and challenges, yet we are still performing well overall, and will forge our way forward.

VIII. Appendices Connected to the Self-Study

APPENDIX I. UNDERGRADUATE DEGREE PROGRAMS

TABLE 1-A First-time Freshmen: Program Applications, Admissions and Enrollments.

CHEM

BA

First-time Freshman Regular Admit

	Applied	Admitted	% Admitted	Enrolled	% Enrolled
2003-2004	7	4	57%	0	0%
2004-2005	2	1	50%	0	0%
2005-2006	1	0	0%	0	
2006-2007	1	0	0%	0	
2007-2008	2	2	100%	2	100%

CHEM

BS

First-time Freshman Regular Admit

	Applied	Admitted	% Admitted	Enrolled	% Enrolled
2003-2004	79	55	70%	9	16%
2004-2005	129	91	71%	20	22%
2005-2006	166	119	72%	21	18%
2006-2007	181	116	64%	14	12%
2007-2008	211	144	68%	27	19%

CHEM-BIOCHM

BS

First-time Freshman Regular Admit

	Applied	Admitted	% Admitted	Enrolled	% Enrolled
2003-2004	251	186	74%	46	25%
2004-2005	351	250	71%	62	25%
2005-2006	460	342	74%	61	18%

2006-2007	555	406	73%	51	13%
2007-2008	598	408	68%	68	17%

TABLE 1-B. Upper Division Transfers: Program Applications, Admissions, and Enrollments

CHEM

BA

Upper Division Transfer

	Applied	Admitted	% Admitted	Enrolled	% Enrolled
2003-2004	1	1	100%	1	100%
2004-2005	1	1	100%	2	200%
2006-2007	3	2	67%	2	100%
2007-2008	4	4	100%	3	75%

CHEM

BS

Upper Division Transfer

	Applied	Admitted	% Admitted	Enrolled	% Enrolled
2003-2004	43	20	47%	8	40%
2004-2005	67	35	52%	17	49%
2005-2006	73	37	51%	14	38%
2006-2007	85	47	55%	24	51%
2007-2008	72	36	50%	15	42%

CHEM-BIOCHM

BS

Upper Division Transfer

	Applied	Admitted	% Admitted	Enrolled	% Enrolled
2003-2004	64	39	61%	21	54%
2004-2005	127	84	66%	31	37%
2005-2006	171	81	47%	36	44%
2006-2007	185	114	62%	52	46%
2007-2008	144	83	58%	42	51%

TABLE 1-C. First-time Freshmen: Special Admit

CHEM

BS

First-time Freshman Special Admit

	Applied	Admitted	% Admitted	Enrolled	% Enrolled
2004-2005	2	2	100%	1	50%
2005-2006	2	2	100%	0	0%

CHEM-BIOCHM

BS

First-time Freshman Special Admit

	Applied	Admitted	% Admitted	Enrolled	% Enrolled
2003-2004	5	5	100%	2	40%
2004-2005	1	1	100%	0	0%
2005-2006	11	11	100%	6	55%
2006-2007	4	4	100%	2	50%
2007-2008	1	1	100%	1	100%

TABLE 2-A. UNDERGRADUATE PROGRAM ENROLLMENT IN FTES

ACADEMIC YEAR	ENROLLMENT		
	LOWER DIVISION	UPPER DIVISION	TOTAL
2003-2004	195.2	132.7	327.9
2004-2005	203.6	144.6	348.2
2005-2006	217.0	157.6	374.6
2006-2007	248.6	174.5	423.1
2007-2008	265.4	184.4	449.9
2008-2009	290.4	177.4	467.7

TABLE 2-B. Undergraduate Program Enrollment (Headcount)

CHEM
BA

	Lower Division		Upper Division		Total	
	Annualized Headcount	AY FTES	Annualized Headcount	AY FTES	Annualized Headcount	AY FTES
2003-2004	8.0	7.2	20.5	15.9	28.5	23.1
2004-2005	8.5	7.1	23.5	18.0	32.0	25.2
2005-2006	4.0	3.6	23.5	18.2	27.5	21.7
2006-2007	1.5	1.5	18.5	13.8	20.0	15.3
2007-2008	4.5	4.0	17.5	13.1	22.0	17.1
2008-2009	7.5	6.5	14.0	11.5	21.5	18.0

CHEM
BS

	Lower Division		Upper Division		Post Bacc (2nd Bacc, PBU, Cred intent)		Total	
	Annualized Headcount	AY FTES	Annualized Headcount	AY FTES	Annualized Headcount	AY FTES	Annualized Headcount	AY FTES
2003-2004	8.5	7.4	30.5	22.6	1.0	0.6	40.0	30.6
2004-2005	26.5	24.6	30.5	21.2	1.5	1.0	58.5	46.8
2005-2006	33.5	30.7	34.5	28.1	1.0	0.8	69.0	59.6
2006-2007	26.5	24.4	48.5	41.4			75.0	65.7
2007-2008	36.0	31.8	42.0	33.8	0.5	0.5	78.5	66.1
2008-2009	24.5	22.2	54.5	44.7			79.0	66.9

CHEM-BIOCHM
BS

	Lower Division		Upper Division		Post Bacc (2nd Bacc, PBU, Cred intent)		Total	
	Annualized Headcount	AY FTES	Annualized Headcount	AY FTES	Annualized Headcount	AY FTES	Annualized Headcount	AY FTES
2003-2004	69.0	63.3	99.0	82.3	2.0	1.3	170.0	146.9
2004-2005	96.0	93.8	117.0	99.1			213.0	192.9
2005-2006	129.0	125.1	140.5	119.3	0.5	0.6	270.0	245.0
2006-2007	122.0	114.1	182.0	151.9	0.5	0.2	304.5	266.2
2007-2008	118.0	110.6	206.0	173.3			324.0	283.9
2008-2009	107.0	96.6	200.5	164.6			307.5	261.2

Table 3-A. First time Freshmen Graduation Rates for Majors

CHEM

BA

First-time Full-time Freshmen

	Initial Cohort	Graduated 3 yrs or less in major	Graduated 3 yrs or less in other major	Graduated 4 yrs or less in major	Graduated 4 yrs or less in other major	Graduated 5 yrs or less in major	Graduated in 5 yrs or less in other major	Graduated in 6 yrs or less in major	Graduated in 6 yrs or less in other major	Total graduated in 6 yrs or less	% Graduated 6 yrs or less	Graduated in 6 yrs or less or enrolled fall yr 7 in major	Graduated in 6 yrs or less or enrolled fall yr 7 in other major
fall 1998	4	0	0	0	0	0	0	2	0	2.	50.0%	2	0
fall 1999	8	0	0	0	0	2	0	3	1	4.	50.0%	3	2
fall 2000	7	0	0	0	0	0	1	0	2	2.	28.6%	0	2
fall 2001	5	0	0	0	0	0	2	0	2	2.	40.0%	0	2
fall 2002	17	0	0	1	0	1	2	2	2	4.	23.5%	3	5

Headcount

	Initial Cohort	% Graduated 3 yrs or less in major	% Graduated in 3 yrs or less in other major	% Graduated in 4 yrs or less in major	% Graduated in 4 yrs or less in other major	% Graduated in 5yrs or less in major	% Graduated in 5 yrs or less in other major	% Graduated in 6yrs or less in major	% graduated in 6 yrs or less in other major	Total graduated in 6 yrs or less	% Graduated in 6 yrs or less	% Graduated in 6yrs or less or enrolled fall yr 7 in major	% Graduated in 6yrs or less or enrolled fall yr7 in other major
fall 1998	4	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	50.0%	0.0%	2.	50.0%	50.0%	0.0%
fall 1999	8	0.0%	0.0%	0.0%	0.0%	25.0%	0.0%	37.5%	12.5%	4.	50.0%	37.5%	25.0%
fall 2000	7	0.0%	0.0%	0.0%	0.0%	0.0%	14.3%	0.0%	28.6%	2.	28.6%	0.0%	28.6%
fall 2001	5	0.0%	0.0%	0.0%	0.0%	0.0%	40.0%	0.0%	40.0%	2.	40.0%	0.0%	40.0%
fall 2002	17	0.0%	0.0%	5.9%	0.0%	5.9%	11.8%	11.8%	11.8%	4.	23.5%	17.6%	29.4%

Percent

Table 3-A. Cont'd.

CHEM

BS

First-time Full-time Freshmen

	Initial Cohort	Graduated 3 yrs or less in major	Graduated 3 yrs or less in other major	Graduated 4 yrs or less in major	Graduated 4 yrs or less in other major	Graduated 5 yrs or less in major	Graduated in 5 yrs or less in other major	Graduated in 6 yrs or less in major	Graduated in 6 yrs or less in other major	Total graduated in 6 yrs or less	% Graduated 6 yrs or less	Graduated in 6 yrs or less or enrolled fall yr 7 in major	Graduated in 6 yrs or less or enrolled fall yr 7 in other major
fall 1998	10	0	0	1	0	2	2	2	3	5.	50.0%	2	4
fall 1999	2	0	0	0	0	1	0	1	0	1.	50.0%	1	1
fall 2000	2	0	0	0	1	0	1	0	1	1.	50.0%	0	2
fall 2001	4	0	0	1	0	1	2	1	2	3.	75.0%	1	2
fall 2002	1	0	0	0	0	0	0	0	0	0.	0.0%	0	0

Headcount

	Initial Cohort	% Graduated 3 yrs or less in major	% Graduated in 3 yrs or less in other major	% Graduated in 4 yrs or less in major	% Graduated in 4 yrs or less in other major	% Graduated in 5yrs or less in major	% Graduated in 5 yrs or less in other major	% Graduated in 6yrs or less in major	% graduated in 6 yrs or less in other major	Total graduated in 6 yrs or less	% Graduated in 6 yrs or less	% Graduated in 6yrs or less or enrolled fall yr 7 in major	% Graduated in 6yrs or less or enrolled fall yr7 in other major
fall 1998	10	0.0%	0.0%	10.0%	0.0%	20.0%	20.0%	20.0%	30.0%	5.	50.0%	20.0%	40.0%
fall 1999	2	0.0%	0.0%	0.0%	0.0%	50.0%	0.0%	50.0%	0.0%	1.	50.0%	50.0%	50.0%
fall 2000	2	0.0%	0.0%	0.0%	50.0%	0.0%	50.0%	0.0%	50.0%	1.	50.0%	0.0%	100.0%
fall 2001	4	0.0%	0.0%	25.0%	0.0%	25.0%	50.0%	25.0%	50.0%	3.	75.0%	25.0%	50.0%
fall 2002	1	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.	0.0%	0.0%	0.0%

Percent

Table 3-A, Cont'd

CHEM-BIOCHM

BS

First-time Full-time Freshmen

	Initial Cohort	Graduated 3 yrs or less in major	Graduated 3 yrs or less in other major	Graduated 4 yrs or less in major	Graduated 4 yrs or less in other major	Graduated 5 yrs or less in major	Graduated in 5 yrs or less in other major	Graduated in 6 yrs or less in major	Graduated in 6 yrs or less in other major	Total graduated in 6 yrs or less	% Graduated 6 yrs or less	Graduated in 6 yrs or less or enrolled fall yr 7 in major	Graduated in 6 yrs or less or enrolled fall yr 7 in other major
fall 1998	17	1	0	1	0	1	4	1	4	5.	29.4%	2	7
fall 1999	27	0	0	0	1	2	4	2	6	8.	29.6%	4	9
fall 2000	20	0	0	0	0	3	3	6	5	11.	55.0%	6	5
fall 2001	24	0	0	4	1	5	2	6	4	10.	41.7%	6	7
fall 2002	25	0	0	1	1	6	5	6	6	12.	48.0%	6	9

Headcount

	Initial Cohort	% Graduated 3 yrs or less in major	% Graduated in 3 yrs or less in other major	% Graduated in 4 yrs or less in major	% Graduated in 4 yrs or less in other major	% Graduated in 5yrs or less in major	% Graduated in 5 yrs or less in other major	% Graduated in 6yrs or less in major	% graduated in 6 yrs or less in other major	Total graduated in 6 yrs or less	% Graduated in 6 yrs or less	% Graduated in 6yrs or less or enrolled fall yr 7 in major	% Graduated in 6yrs or less or enrolled fall yr7 in other major
fall 1998	17	5.9%	0.0%	5.9%	0.0%	5.9%	23.5%	5.9%	23.5%	5.	29.4%	11.8%	41.2%
fall 1999	27	0.0%	0.0%	0.0%	3.7%	7.4%	14.8%	7.4%	22.2%	8.	29.6%	14.8%	33.3%
fall 2000	20	0.0%	0.0%	0.0%	0.0%	15.0%	15.0%	30.0%	25.0%	11.	55.0%	30.0%	25.0%
fall 2001	24	0.0%	0.0%	16.7%	4.2%	20.8%	8.3%	25.0%	16.7%	10.	41.7%	25.0%	29.2%
fall 2002	25	0.0%	0.0%	4.0%	4.0%	24.0%	20.0%	24.0%	24.0%	12.	48.0%	24.0%	36.0%

Percent

TABLE 3-B Transfer Student Graduation Rates for Majors

CHEM

BA

New Upper Division Transfers

	Initial Cohort	Graduated 3 yrs or less in major	Graduated 3 yrs or less in other major	Graduated 4 yrs or less in major	Graduated 4 yrs or less in other major	Graduated 5 yrs or less in major	Graduated in 5 yrs or less in other major	Graduated in 6 yrs or less in major	Graduated in 6 yrs or less in other major	Total graduated in 6 yrs or less	% Graduated 6 yrs or less	Graduated in 6 yrs or less or enrolled fall yr 7 in major	Graduated in 6 yrs or less or enrolled fall yr 7 in other major
fall 1998	8	0	1	2	2	2	2	2	2	4.	50.0%	2	2
fall 1999	6	1	0	1	0	1	0	2	0	2.	33.3%	2	0
fall 2000	5	1	1	2	1	2	1	2	1	3.	60.0%	2	1
fall 2001	6	1	0	1	0	2	1	2	2	4.	66.7%	2	2
fall 2002	4	0	0	1	0	2	0	2	0	2.	50.0%	2	1

Headcount

	Initial Cohort	% Graduated 3 yrs or less in major	% Graduated in 3 yrs or less in other major	% Graduated in 4 yrs or less in major	% Graduated in 4 yrs or less in other major	% Graduated in 5yrs or less in major	% Graduated in 5 yrs or less in other major	% Graduated in 6yrs or less in major	% graduated in 6 yrs or less in other major	Total graduated in 6 yrs or less	% Graduated in 6 yrs or less	% Graduated in 6yrs or less or enrolled fall yr 7 in major	% Graduated in 6yrs or less or enrolled fall yr7 in other major
fall 1998	8	0.0%	12.5%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	4.	50.0%	25.0%	25.0%
fall 1999	6	16.7%	0.0%	16.7%	0.0%	16.7%	0.0%	33.3%	0.0%	2.	33.3%	33.3%	0.0%
fall 2000	5	20.0%	20.0%	40.0%	20.0%	40.0%	20.0%	40.0%	20.0%	3.	60.0%	40.0%	20.0%
fall 2001	6	16.7%	0.0%	16.7%	0.0%	33.3%	16.7%	33.3%	33.3%	4.	66.7%	33.3%	33.3%
fall 2002	4	0.0%	0.0%	25.0%	0.0%	50.0%	0.0%	50.0%	0.0%	2.	50.0%	50.0%	25.0%

Table 3-B. Cont'd.

CHEM

BS

New Upper Division Transfers

	Initial Cohort	Graduated 3 yrs or less in major	Graduated 3 yrs or less in other major	Graduated 4 yrs or less in major	Graduated 4 yrs or less in other major	Graduated 5 yrs or less in major	Graduated in 5 yrs or less in other major	Graduated in 6 yrs or less in major	Graduated in 6 yrs or less in other major	Total graduated in 6 yrs or less	% Graduated 6 yrs or less	Graduated in 6 yrs or less or enrolled fall yr 7 in major	Graduated in 6 yrs or less or enrolled fall yr 7 in other major
fall 1998	5	3	0	3	1	3	1	3	1	4.	80.0%	3	1
fall 1999	7	1	0	2	2	2	2	2	2	4.	57.1%	2	2
fall 2000	5	1	0	3	1	4	1	4	1	5.	100.0%	4	1
fall 2001	4	2	0	3	0	3	0	3	0	3.	75.0%	3	0
fall 2002	2	0	0	0	0	0	0	0	0	0.	0.0%	0	0

Headcount

	Initial Cohort	% Graduated 3 yrs or less in major	% Graduated in 3 yrs or less in other major	% Graduated in 4 yrs or less in major	% Graduated in 4 yrs or less in other major	% Graduated in 5yrs or less in major	% Graduated in 5 yrs or less in other major	% Graduated in 6yrs or less in major	% graduated in 6 yrs or less in other major	Total graduated in 6 yrs or less	% Graduated in 6 yrs or less	% Graduated in 6yrs or less or enrolled fall yr 7 in major	% Graduated in 6yrs or less or enrolled fall yr7 in other major
fall 1998	5	60.0%	0.0%	60.0%	20.0%	60.0%	20.0%	60.0%	20.0%	4.	80.0%	60.0%	20.0%
fall 1999	7	14.3%	0.0%	28.6%	28.6%	28.6%	28.6%	28.6%	28.6%	4.	57.1%	28.6%	28.6%
fall 2000	5	20.0%	0.0%	60.0%	20.0%	80.0%	20.0%	80.0%	20.0%	5.	100.0%	80.0%	20.0%
fall 2001	4	50.0%	0.0%	75.0%	0.0%	75.0%	0.0%	75.0%	0.0%	3.	75.0%	75.0%	0.0%
fall 2002	2	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.	0.0%	0.0%	0.0%

Percent

TABLE 4. Degrees Awarded - Undergraduate

CHEM

	BA	BS
2002-2003	6	8
2003-2004	6	8
2004-2005	8	7
2005-2006	10	5
2006-2007	6	2
2007-2008	6	4

CHEM
CHEM-BIOCHM

	BS
2002-2003	21
2003-2004	22
2004-2005	31
2005-2006	18
2006-2007	40
2007-2008	26

APPENDIX II. GRADUATE DEGREE PROGRAMS

TABLE 5. Graduate Program Applications, Admissions, and Enrollments

CHEM
MS
First-time or Transfer Masters

	Applied	Admitted	% Admitted	Enrolled	% Enrolled
2003-2004	56	34	61%	20	59%
2004-2005	65	48	74%	30	63%
2005-2006	52	27	52%	11	41%
2006-2007	73	38	52%	16	42%
2007-2008	51	21	41%	15	71%

CHEM-GEOCHM
MS
First-time or Transfer Masters

	Applied	Admitted	% Admitted	Enrolled	% Enrolled
2003-2004	1	0	0%	0	
2004-2005	1	1	100%	1	100%
2007-2008	1	0	0%	0	

TABLE 6-A and 6-B Graduate Program Enrollment in Headcount and FTES

CHEM
MS

	Masters		Total	
	Annualized Headcount	AY FTES	Annualized Headcount	AY FTES
2003-2004	39.5	18.7	39.5	18.7
2004-2005	51.0	24.1	51.0	24.1
2005-2006	39.5	20.0	39.5	20.0
2006-2007	37.5	17.2	37.5	17.2
2007-2008	38.0	18.7	38.0	18.7
2008-2009	44.0	20.7	44.0	20.7

CHEM-GEOCHM
MS

	Masters		Total	
	Annualized Headcount	AY FTES	Annualized Headcount	AY FTES
2004-2005	1.0	0.5	1.0	0.5
2007-2008	1.0	0.3	1.0	0.3
2008-2009	1.0	0.3	1.0	0.3

Table 7. Graduation Rates for Master's-Seeking Students

CHEM

MS

New Masters

	Initial Cohort	Graduated 3 yrs or less in major	Graduated 3 yrs or less in other major	Graduated 4 yrs or less in major	Graduated 4 yrs or less in other major	Graduated 5 yrs or less in major	Graduated in 5 yrs or less in other major	Graduated in 6 yrs or less in major	Graduated in 6 yrs or less in other major	Total graduated in 6 yrs or less	% Graduated 6 yrs or less	Graduated in 6 yrs or less or enrolled fall yr 7 in major	Graduated in 6 yrs or less or enrolled fall yr 7 in other major
fall 1998	13	4	0	4	0	5	0	6	0	6.	46.2%	7	0
fall 1999	11	5	0	5	0	6	0	6	0	6.	54.5%	7	0
fall 2000	8	1	0	1	0	1	0	2	0	2.	25.0%	2	0
fall 2001	12	3	0	6	0	6	0	6	0	6.	50.0%	6	0
fall 2002	17	4	0	7	0	7	0	7	0	7.	41.2%	7	0

Headcount

	Initial Cohort	% Graduated 3 yrs or less in major	% Graduated in 3 yrs or less in other major	% Graduated in 4 yrs or less in major	% Graduated in 4 yrs or less in other major	% Graduated in 5yrs or less in major	% Graduated in 5 yrs or less in other major	% Graduated in 6yrs or less in major	% graduated in 6 yrs or less in other major	Total graduated in 6 yrs or less	% Graduated in 6 yrs or less	% Graduated in 6yrs or less or enrolled fall yr 7 in major	% Graduated in 6yrs or less or enrolled fall yr7 in other major
fall 1998	13	30.8%	0.0%	30.8%	0.0%	38.5%	0.0%	46.2%	0.0%	6.	46.2%	53.8%	0.0%
fall 1999	11	45.5%	0.0%	45.5%	0.0%	54.5%	0.0%	54.5%	0.0%	6.	54.5%	63.6%	0.0%
fall 2000	8	12.5%	0.0%	12.5%	0.0%	12.5%	0.0%	25.0%	0.0%	2.	25.0%	25.0%	0.0%
fall 2001	12	25.0%	0.0%	50.0%	0.0%	50.0%	0.0%	50.0%	0.0%	6.	50.0%	50.0%	0.0%
fall 2002	17	23.5%	0.0%	41.2%	0.0%	41.2%	0.0%	41.2%	0.0%	7.	41.2%	41.2%	0.0%

Percent

TABLE 8. Master's Degrees Awarded

CHEM

	MS
2002-2003	5
2003-2004	7
2004-2005	11
2005-2006	8
2006-2007	4
2007-2008	7

APPENDIX III. DOCUMENTING ACADEMIC ACHIEVEMENT

A. Plan for Documentation of Academic Achievement (Assessment of Student Learning)

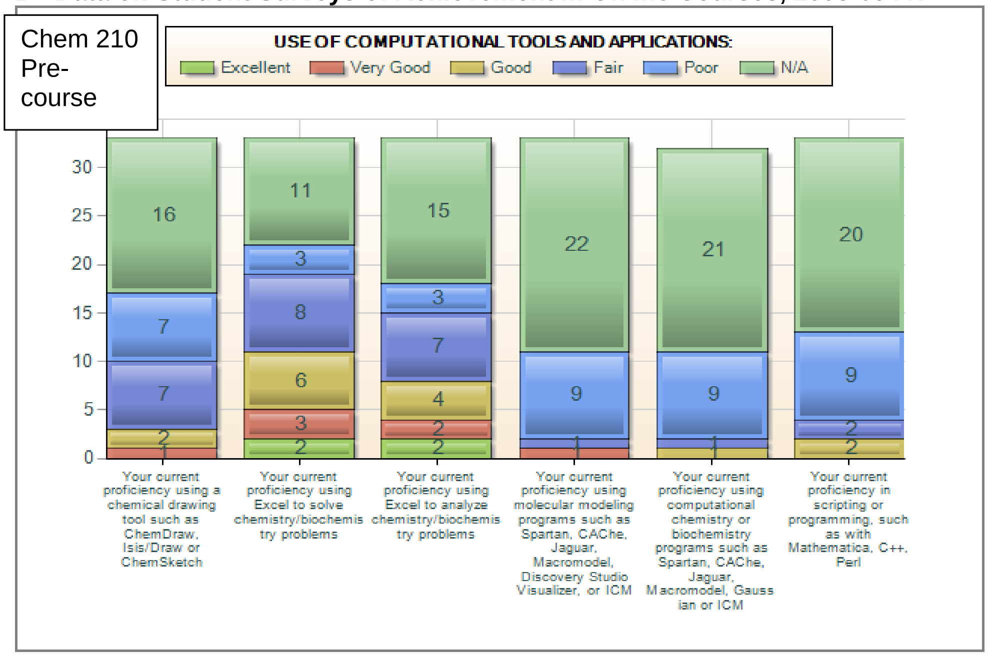
Department/Program__Chemistry and Biochemistry_____ Date__April, 2009________________

P = Planning E = Emerging D = Developed HD = Highly Developed

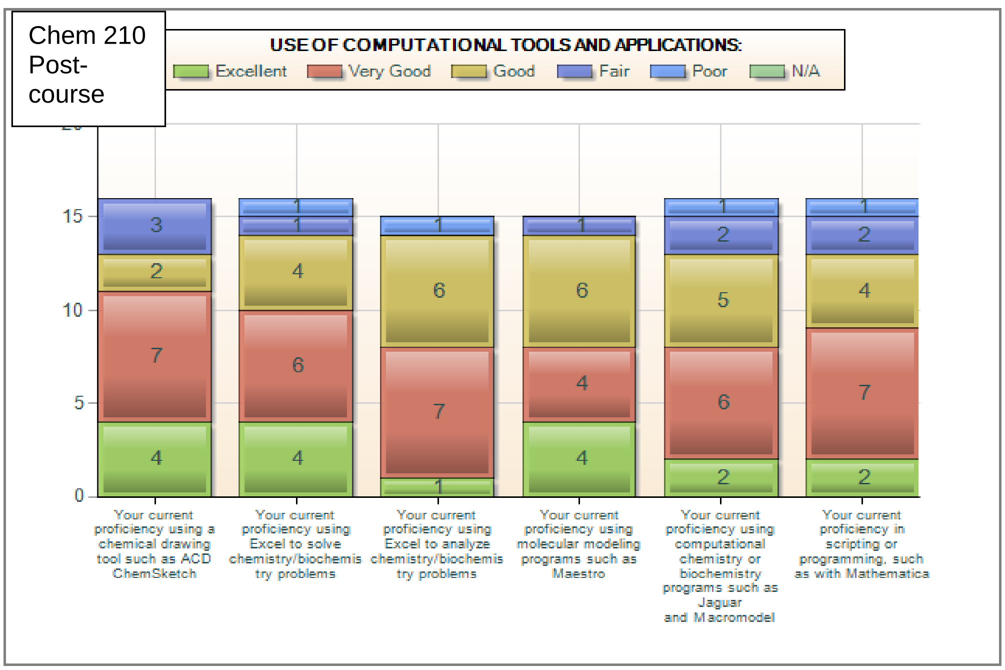
	Achievement Plan Component	P	E	D	HD	Comments/Details
I	**Mission Statement**					
	a. Provide a concise and coherent statement of the goals and purposes of the department/program				X	
	b. Provide a comprehensive framework for student learning outcomes			X		
	c. Describe department/program assessment structure, e.g. committee, coordinator		X			
II	**Student Learning Goals**					
	a. Identify and describe knowledge, skills, or values expected of graduates			X		
	b. Consistent with mission			X		
	c. Provide the foundation for more detailed descriptions of learning outcomes			X		
III	**Student Learning Outcomes**					
	a. Aligned with learning goals			X		
	b. Use action verbs that describe knowledge, skills, or values students should develop			X		
	c. Specify performance, competencies, or behaviors that are observable and measurable			X		
IV	**Assessment Strategies**					
	a. Use specific multiple measures for assessment of learning outcomes other than grades			X		
	b. Use direct measures of student learning outcomes			X		
	c. Indirect measures may also be used but along with direct measures			X		
	d. Measures are aligned with learning outcomes			X		
	e. Each outcome is measured		X			
V	**Utilization for Improvement**					
	a. Identify who interprets the evidence and detail the established process		X			
	b. How are findings utilized? Provide examples	X				

B. Data on Student Surveys of Achievement in Online Courses, 2008-09 AY

Chem 210 Pre-course



Chem 210 Post-course



APPENDIX IV. FACULTY

Table 9. Full-Time Instructional Faculty, FTEF, FTES, SFR

Academic Year	Tenured	Tenure Track	Sabbaticals at 0.5	FERP at 0.5	Full-Time Lecturers	Part-Time Lecturers	FTEF Allocation	FTES Target	Actual FTES	Budget SFR
2003-2004	10	4	0.5	2	1	5	21.3	330	339.2	15.5
2004-2005	9	5	0.5	2.5	1	6	21.8	340	363.0	15.6
2005-2006	11	4	0	2	1	7	24.2	386	385.8	16.0
2006-2007	10	5	0.5	1	1	10	27.1	433	433.4	16.0
2007-2008	9	6	N/A	0	2	12	29.2	460	460.4	15.8
2008-2009	11	7	1	0	1	13		460	474.0	15.8

APPENDIX V. RESOURCES

TABLE 10 STATE AND NON-STATE SUPPORTED RESOURCES (LAST 5 YEARS)

STATE RESOURCES

	2004-2005	2005-2006	2006-2007	2007-2008	2008-2009
Faculty salaries	1,126,589	1,281,300	1,307,078	1,361,422	1,314,420
PT blanket*	380,715	389,629	378,287	458,192	521,304
Staff salaries	360,605	368,720	390,219	379,414	350,714
Temp help	37,665	29,982	56,000	23,095	
Student asst	62,570	62,120	55,400	67,792?	58,750
Additional baseline**		134,463	207,117	214,368	80,810
OE&E	88,766	88,766	88,766	94,766	59,537
Carryforward	266,628	202,709		198,401	24,000
Extended Ed	12,485	11,304	21,042	32,690	32,108
Misc course fees	31,650	31,650	33,518	33,759	36,518
Equip/Computer alloc.		93,250	106,755	156,578	
College allotment		97,283			
Nursing			52,128		6,000
Startup			47,166	138,366	124,641
Grant buyouts***	108,329	98,208	79,148	22,216	56,966
Internal/CSUPERB grants	No data	No data	73,245	20,000	10,000
Grant Total	**$2,630,667**	**$3,043,474**	**$3,060,921**	**$3,249,143**	**$3,339,222**

*Part time lecturers, teaching assistants, graduate assistants
**FTEF allocation
***For released time (including contributed release time from university and Dean's match, where applicable)

NON-STATE RESOURCES

Student Research Support Grants
IMSD Grant (1990 – 2006) Minority Scientist Development grant from the National Institutes of Health. Provided financial (hourly wage) support for 10-15 undergraduates and graduate students doing research with faculty 15 hours per week during the academic year and full time for 10 weeks in summer, as well as travel to conferences, and $1000 per student in research supplies (about $15,000 per student per year). The grant was not renewed during the last round.

Bridges to the Doctoral Degree (2002-2007) Grant from the NIH to support underrepresented minority students entering PhD programs in biomedically-related sciences at local UCs. Provided support similar to that for the IMSD program to carry out research with CSUF faculty, but also more direct access to specific UCs.

REU Grant (1991-present) Research Experience for Undergraduates, from the National Science Foundation, Chemistry division. Provides about $65,000 annually to support 9-10 students for 10 weeks of undergraduate research training every summer (stipends plus $1000 per student in research supplies, augmented to $2,000 by the department). International REU (2007 and 2009) Research Experience for Undergraduates, through the American Chemical Society (now also with a grant from NSF) and German equivalent. Provides travel funds and stipend for 1-2 German students coming to CSUF to participate in the existing summer REU program. (No faculty supply funds.)

Cypress College REU-type grant (from NSF) (2009). Provides stipends for 2-4 Cypress College (community college) undergraduates to do research in the Department of Chemistry and Biochemistry, CSUF, for 8-10 weeks in the summer. Integrated with the REU program. Also provides $1,000 in supply money and $3,000 faculty stipend, per student.

Howard Hughes Medical Institute-CSUF Research Scholars Program (2008-2012). Provides $1.2 million over 4 years (possibly a little less with the budget crisis) in support of three different programs, mainly to support undergraduates - but also high school student/high school science teacher cohorts, in exposure to biomedically related research with CSUF faculty. The three programs are (1) high potential CSUF undergraduates doing research 15 hours per week during the academic year and full time for at least 10 weeks in the summers, and given strong mentoring, for two years, with objectives to enter PhD or PhD/MD programs (along the lines of the NIH funded MARC program); (2) CSUF and community college undergraduates doing 10 weeks of research during the summer (as for the REU program), along with high school science teacher/high school student cohorts doing research for 5 weeks; (3) community college students and high school science teacher/HS student cohorts doing a two-weekend research project. This program involves faculty from Chemistry and Biochemistry, as well as Biological Science and Mathematics. Undergraduate students and science teachers receive stipends. Year-round scholars also receive tuition assistance and travel funds. Faculty receive $1,000 or 2,000 in supply monies, per student, for the summer and year round programs.

MARC (about 1997-present). Minority Access to Research Careers, supported by the NIH. Provides financial support for 7-8 students to participate in an intensive and highly mentored, two year research experience, the objective being to enter PhD programs in biomedical science. Involves faculty from Chemistry and Biochemistry, Biological Science, and Psychology. Students receive stipends, tuition assistance, travel funds, and support for one summer research experience at a PhD granting institution. Faculty receive $2,000 per year in supply money.

Louis Stokes Alliance for Minority Participation (LSAMP) (1996-present). Available through a continuing NSF grant to the CSU system. Supports the education and development of underrepresented minority students in the physical sciences and mathematics. Provides stipends, recitation workshops, intensive mentoring and research opportunities.

Instrumentation Grants
NSF-MRI grant (2005-06) for 400 MHz NMR ($350,000).
NSF-MRI grant (2007-08) for a research-grade EPR spectrometer system consisting of a powerful magnet and an X-band (9.5 GHz) microwave transmitter/receiver, used in conjunction to study the magnetic resonance behavior of free radicals and transition-metal complexes. Manufactured by Bruker-Biospin, our particular model is an EMX*plus* instrument.

Research Grants (see Appendix VIII).

APPENDIX VI. LONG TERM PLANNING (Definitions and examples of indicators of quality and measures of productivity)

This was already presented in Section III of the Self Study, above. As described, the department developed goals (and strategies) with regard to student learning, scholarship, and service, along with criteria for their assessment. What was developed and presented in the tables indicates how we defined and analyze academic work and achievements, and it is clear that research and scholarly activities in chemistry and biochemistry are a significant component of measuring student learning outcomes.

In general, the department sees research and scholarly activity (on the part of students and faculty) as integral to the disciplines of chemistry and biochemistry; hence their inclusion in our degree programs. Practical experience in the laboratory (whether "wet" or computational) or reviewing research results in the library, is part of what chemists and biochemists do in the workplace. We thus see our degree programs as providing graduates better trained in their discipline than is the case for most other kinds of colleges and universities. It gives them an edge in acquiring jobs in various industries and also in applying to graduate and professional programs, which value this kind of background. We are supplying many of the technical personnel to local industries that require a chemistry or biochemistry background. Many also enter professional programs in various health sciences (from medicine to pharmacy). One of our major successes is that of giving students with an uncertain or non-stellar undergraduate background, or who were not able to decide upon a career requiring further education, a chance to prove themselves in our graduate program, and in doing so, these students become eligible (and sought after) for entry into doctoral and professional programs.

Our long term goals are to perpetuate and perfect these aspects of our undergraduate and graduate student learning experiences, which will remain the focus of our degree programs. At the same time, we have planned and already begun to implement an additional applied emphasis for the BA chemistry degree, as well as an applied MA Chemistry degree (already indicated). This is in response to what we perceive as a need on the part of some of our students, particularly those already working in local industry and other institutions, to gain more practical laboratory skills with less concern about the research aspect.

APPENDIX VII. DEPARTMENT VISION AND CORE VALUES

Vision Statements

The department of Chemistry and Biochemistry will:

1. Create a collegial, collaborative, supportive environment and departmental structure that nurture professional relationships, enrich teaching and learning, develop and strengthen scholarship, and encourage professional service.
2. Be a leader in undergraduate and master's level research.
3. Offer a rigorous and contemporary curriculum that is responsive to future developments, reflects the interdisciplinary nature and diversity of the chemical sciences, and enables students to become successful professionals, scholars, scientifically literate citizens and leaders.
4. Make significant contributions to and have major/notable impact on chemical education, teacher preparation and professional development in the region.
5. Promote excellence in service to the department, university and community, and cultivate ties with local and regional industry and academic institutions.

Core Values

1. Collegial Professional Environment
    - We strive to create an environment where people want to work and work together to contribute to the success of the Department as a whole.
    - We foster an environment based on mutual respect, communication, appreciation for others, and openness to new ideas.
    - In all our dealings we strive to be honest and truthful, fair and compassionate, to behave ethically, with integrity, to take responsibility for our actions, and to honor our commitments.
2. Commitment
    - We are committed to positive change and constant improvement of our programs. We work together as a team to make decisions in the best interests of the Department.
    - We have a mutual understanding of our mission and goals and what is expected of each other. We take seriously our service responsibilities as citizens of the Department, University and Community.
    - Members of the Department (faculty, staff and students) take initiative and assume leadership roles.
3. Student Success
    - We are committed to the professional success of our students as critical thinkers and effective communicators, both orally and in writing. We provide innovative and contemporary curricula, quality instruction, a challenging environment with high standards, good mentoring and academic advisement.
    - We strive to provide the best possible environment for excellence in undergraduate and graduate level research.
4. Excellence in Research and Creative Activities
    - We encourage, expect and support excellence in research and creative activities.

- We expect research and creative activities to meaningfully involve students.
- We encourage collaboration and "integration" within the larger scholarly community that includes students and fosters collaboration.

5. Professional Development
    - We value opportunities for and nurturing of faculty growth and professional development, to promote excellence, quality and competence in both teaching and scholarship.
    - We have established standards by which we honestly and fairly evaluate our peers.
6. Community Outreach and Public Engagement
    - We pledge to work cooperatively with educational institutions, industry and other regional institutions to promote public education and to adequately address regional and statewide needs of the community and the workforce.

APPENDIX VIII. DEPARTMENT PRODUCTIVITY, AWARDS, AND SPECIAL PROGRAMS

PUBLICATIONS

The faculty currently in our department have, while at CSUF, published about 93 mostly peer-reviewed articles over the last 7 years, mostly on their research (also some reviews) in the chemical and biochemical literature. (This number of articles does not include anything published by faculty who have retired during the period in question.)

CONFERENCE PRESENTATIONS (only those at regional, national and international meetings)

Faculty, mostly with some or their students, have presented their research at numerous regional (mostly ACS), national and international meetings and conferences (such as Gordon conferences). Based on data (not entirely complete) for only those faculty that are currently part of the department, and only including presentations made while part of our faculty, the number of presentations is about 246, over the last 7 years. Hundreds of other presentations, especially by students, were also made at the local level and at the annual CSUPERB conferences in Southern or Northern California.

FACULTY RESEARCH GRANTS

Of the current faculty in our department at the present time (and not including those who started this year), 9 have obtained external grants of varying size in support of their research, and several of those more than one. The major grants have been NSF-RUI grants, some renewed, going to three of our faculty; an NIH AREA grant going to another; several PRF and Research Corporation grants going to four faculty; and two NIH RO1 grants going to one faculty member. The value of these grants amounted to about $3.2 million.

INSTRUMENTATION GRANTS (see Appendix V)

STUDENT SUPPORT PROGRAM GRANTS (see Appendix V)

FACULTY AWARDS

Awards from the College of Natural Science and Mathematics:

2002-2003	Peter de Lisjer - Outstanding contributions to student success
	Katherine Kantardjieff – Outstanding teaching
	Fu-Ming Tao – Outstanding research
2004-2005	Chris Meyer – Outstanding research
2006-2007	Chandra Srinivasan – Outstanding untenured faculty member
2007-2008	Peter de Lijser – Outstanding contributions to student success
	Chris Meyer – Distinguished Faculty Member
2008-2009	Christina Goode – Outstanding contributions to student success
	Katherine Kantardjieff – Distinguished Faculty Member

Awards from CSUPERB (CSU program for education and research in biotechnology)

2004	Chris Meyer – Outstanding research
2009	Katherine Kantardjieff – Andreoli Award, for outstanding service

CSU-Wide Wang Family Excellence Award

2007 Maria Linder – for outstanding contributions in the natural sciences, mathematics and engineering

KECK CENTER FOR MOLECULAR STRUCTURE

The nationally and internationally recognized Keck Center for Molecular Structure (CMolS), housed in our department, is the first research facility of its kind at a PUI, and a CSUPERB core facility dedicated to structure determination and analysis using X-ray diffraction. CMolS provides diffractometers for small molecule and macromolecular crystallography, as well as basic powder diffraction analysis. CMolS also provides high-end computational facilities for modeling and refinement, virtual screening, quantum mechanical and molecular dynamics calculations. Crystallization screening and diagnostics capabilities include commercial screening systems, static and dynamic light scattering, and stereo microscopes with crossed polarizers and digital imaging.

CMolS is directed by Katherine Kantardjieff. The department commits 3 units of academic year released time to support this effort, and the College provides a Research Associate/post doctoral fellow for the same purpose. X-ray diffractometers, which include a Bruker SMART 1K CCD Detector/2kW normal focus Mo sealed tube source and Hi-Star Multiwire Area Detector/Scintillation Detector/18kW Cu fine focus rotating anode systems, both with low temperature capabilities, have been remotely accessible to outside users since 1997. In 2005 became a core node in the nationwide consortium, the STaRBURSTT-CDC[2]. Because of Katherine's visibility in the crystallographic community, CMolS was selected as a showcase laboratory for Oxford Diffraction Systems, receiving $450K of instrumentation in 2006. In 2008 and 2009 CMolS received funding from Boeing ($58K) to support *PRISSM*[2], harnessing the power of end-to-end cyber-infrastructure to bring together a variety of sophisticated instruments in the CSU. Building on existing programs and expertise, *PRISSM* provides students, college/university faculty, and secondary classrooms with real-time remote access and control of specialized scientific instruments from remote locations, together with real-time discourse. In 2008, Katherine was also PI on a $62K NSF grant that funded a workshop on "Cyber-Enabled Instruments in Chemistry", the outcome of which is a white paper guiding NSF funding efforts in this area for the next five years. CMolS has also been funded by the NSF since 2001 to host summer professional development workshops in crystallography and structure guided drug design for faculty from predominantly undergraduate institutions.

While most CSUPERB-sponsored core facilities offer reduced pricing to CSU faculty, there has been a misperception among CSU faculty that this access is at no charge. Differences in institutional structures have presented challenges for collaborative activity between institutions, and contractual mechanisms between campuses have been problematic. Thus, CMolS continues to seek and find creative ways to cover operational costs and maintain/upgrade instruments, which includes taking on more non-CSU (contract) work. To upgrade the Hi-Star, CMolS hopes to soon

[2] Science Teaching and Research Brings Undergraduate Research Strengths Through Technology – Cyber Diffraction Consortium

[2] Partnership for Remote Instruments to Study the Structure of Matter

receive a Rigaku R-Axis system, the generous gift of Anadys Pharmaceuticals in San Diego, CA.

CMolS serves as project leader for a CSU research partnership with the Stanford Synchrotron Radiation Lightsource (SSRL), preparing research proposals, designing experiments, and coordinating beamline requests and usage. This partnership provides access to state-of-the-art scientific instruments on several beamlines (single crystal, fiber, and powder diffraction, as well as EXAFS) at SSRL to *any* interested CSU researchers who believe that an understanding of molecular structure will advance their research. This partnership leverages access, bringing many new scientific users into SSRL and providing valuable research and educational tools to all members of CSUPERB, *including students*.

Since 1997, CMolS has supported nearly 50 research projects, 12 of which were macromolecular. These projects, involving 18 predominantly undergraduate institutions (15 CSU campuses), have resulted in 40 manuscripts published or in press, 85% of which have more than one student co-author. Another 5 have been submitted. There are currently 17 “active” research projects, 7 macromolecular, involving 8 PUIs (5 CSU campuses). CMolS coordinates two beamline proposals at SSRL, one supporting protein crystallography and involving six PIs from 5 CSU campuses and one additional PUI. The second supports biological fiber diffraction and involves 2 PIs from 2 CSU campuses.

Appendix IX. California State University, Fullerton, Mission, Goals & Strategies

Mission Statement

Learning is preeminent at California State University, Fullerton. We aspire to combine the best qualities of teaching and research universities where actively engaged students, faculty, and staff work in close collaboration to expand knowledge. Our affordable undergraduate and graduate programs provide students the best of current practice, theory, and research and integrate professional studies with preparation in the arts and sciences. Through experiences in and out of the classroom, students develop the habit of intellectual inquiry, prepare for challenging professions, strengthen relationships to their communities and contribute productively to society. We are a comprehensive, regional university with a global outlook, located in Orange County, a technologically rich and culturally vibrant area of metropolitan Los Angeles. Our expertise and diversity serve as a distinctive resource and catalyst for partnerships with public and private organizations. We strive to be a center of activity essential to the intellectual, cultural, and economic development of our region.

Goals & Strategies

I. To ensure the preeminence of learning, we will:

A. Establish an environment where learning and the creation of knowledge are central to everything we do.
B. Integrate teaching, scholarly and creative activities, and the exchange of ideas.
C. Assess student learning collegially and continually use the evidence to improve programs.
D. Affirm the university's commitment to freedom of thought, inquiry, and speech.
E. Recruit and retain a highly-qualified and diverse staff and faculty.
F. Develop and maintain attractive, accessible, and functional facilities that support learning.
G. Integrate advances in information technologies into learning environments.
H. Develop a strong library which provides rapid access to global information and serves as a nexus for learning.

II. To provide high quality programs that meet the evolving needs of our students, community, and region, we will

A. Support undergraduate and graduate programs in professional and preprofessional studies and in the arts and sciences.
B. Integrate knowledge with the development of values, professional ethics, and the teamwork, leadership, and citizenship skills necessary for students to make meaningful contributions to society.
C. Develop a coherent and integrated general education program.
D. Provide experiences in and out of the classroom that attend to issues of culture, ethnicity, and gender and promote a global perspective.
E. Offer continuing education programs that provide retraining and meet professional certification and other community needs.
F. Capitalize on the uniqueness of our region, with its economic and cultural strengths, its rich ethnic diversity, and its proximity to Latin America and the Pacific Rim.

G. Provide opportunities to learn from external communities through internships, cooperative education, and other field activities.
H. Provide opportunities for students to participate in a competitive intercollegiate athletics program.
I. Provide opportunities for recreation and enhanced physical well-being.

III. To enhance scholarly and creative activity, we will:
A. Support faculty research and grant activity that leads to the generation, integration and dissemination of knowledge.
B. Encourage departments to reconsider the nature and kinds of scholarship within the discipline and to create a culture conducive to scholarly and creative activity.
C. Encourage departments to implement a plan and personnel document supportive of scholarly and creative activities consistent with collegial governance and the university's mission and goals.
D. Cultivate student and staff involvement in faculty scholarly and creative activity.
E. Provide students, faculty, and staff access to and training in the use of advanced technologies supportive of research, scholarly, and creative activity.

IV. To make collaboration integral to our activities, we will:
A. Create opportunities in and out of the classroom for collaborative activities for students, faculty, and staff.
B. Leverage our membership within the largest university system in the United States to advance the University's mission.
C. Encourage, recognize, and reward interdisciplinary and cross-unit collaboration.
D. Promote collaborative and innovative exchanges with other educational institutions at all levels to maximize the efficient use of resources and enhance opportunities for all learners.

V. To create an environment where all students have the opportunity to succeed, we will:
A. Develop an innovative outreach and simplified admissions system that enhances recruitment of qualified students.
B. Ensure that students of varying age, ethnicity, culture, academic experience, and economic circumstances are well served.
C. Facilitate a timely graduation through class availability and effective retention, advisement, career counseling, and mentoring.
D. Provide an affordable education without sacrificing quality.
E. Provide an efficient and effective financial aid system.
F. Maximize extramural funding and on-campus employment to defray students' educational costs.
G. Provide an accessible, attractive and safe environment, and a welcoming campus climate.

VI. To increase external support for university programs and priorities, we will:
A. Increase the proportion of campus resources generated by private giving.

B. Strengthen links with our alumni that optimize an on-going commitment to the success of the University.
C. Increase our effectiveness in obtaining grants and contracts, consistent with university mission and goals.
D. Convey a clear message to the public that we are essential to the cultural, intellectual, and economic development of the region.

VII. To expand connections and partnerships with our region, we will:
A. Develop mutually beneficial working partnerships with public and private sectors within our region.
B. Serve as a regional center for intellectual, cultural, athletic and life-long learning activities.
C. Develop community-centered programs and activities, consistent with our mission and goals, that serve the needs of our external communities.
D. Involve alumni as valued participants in the on-going life of the university.

VIII. To strengthen institutional effectiveness, collegial governance and our sense of community, we will:
A. Assess university activities and programs to ensure that they fulfill our mission and to identify areas of needed improvement, change, or elimination.
B. Create simplified and responsive decision-making structures that reduce fragmentation and increase efficiency.
C. Strengthen shared collegial governance in order to build community and acknowledge our collective responsibility to achieve the University's goals.
D. Provide a good work environment with effective development and training programs that assist employees in meeting their job requirements and in preparing for advancement.
E. Ensure our reward systems are compatible with our mission and goals by reviewing the multiple roles of faculty and staff through the various stages of their careers.
F. Integrate advances in information and communication technologies into work environments.
G. Enhance a sense of community to ensure that faculty, students, and staff have as a common purpose the achievement of the overall goals of the University.