Executive Summary

The Department of Chemistry and Biochemistry at San Francisco State University is facing some crucial issues in the coming years in its efforts to maintain and even perhaps expand the current high quality graduate program. These challenges are even more formidable during times of reduced budgets and fewer than optimal numbers of tenure-track faculty. However, the Department has the advantage of a good collegial atmosphere and administrative support at the College, Graduate School and Provost levels.

The faculty and chair have done a thorough review of the department’s resources and curriculum. They have identified potential improvements and problems that will require additional resources to solve. This should be a continuing process that evolves with changes in funding as well as the make-up of the faculty and staff.

The most significant need for the Department is improved facilities. While renovation can moderate some of the problems, many are the result of outdated design and priorities in a building that is more than 30 years old. This will be difficult to overcome through renovation. The optimum solution is a new building designed to meet the safety and health requirements of current regulations as well as the curricular and research priorities of the Department.

Faculty recruitment is also a high priority. While recent faculty hires have been of high quality that are sufficient to fulfill some of the curricular goals of the Department, the number of faculty has significantly diminished in recent years so that offering a reasonable number and variety of graduate courses is difficult.

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Goals and Objectives of the Department

The goals and objectives of the Department are consistent with the development and maintenance of a high quality Master’s degree program within the California State University system. While certain aspects of a broad knowledge in the field of chemistry are included in the course of study, the major emphasis is on the research experience. This focus is very appropriate as a means of preparing students to be productive and independent scientists. With a Master’s degree in chemistry, graduates should be able to assume independent positions in a variety of industrial or government laboratories, eventually moving on to a supervisory position after an adequate number of years in the field to gain the necessary experience.

Another focus of the Master’s program is to prepare students to move on to high quality Ph.D. programs, or in some instances other professional programs. Students who gain entrance into the Master’s program on a CSU campus are often undecided about graduate school or do not have a sufficiently strong academic record that is required for admission into an excellent Ph.D. program. The Master’s degree at the CSU offers these students the opportunity to enhance their academic record and gain additional research experience that will make them competitive applicants for the better doctoral or professional programs. The Master’s degree program in Chemistry at San Francisco State is well-designed for this purpose as evidenced by the fact that significant numbers of graduates have moved on to doctoral programs or other professional training.

Faculty

The faculty in the Department of Chemistry and Biochemistry are professionally active and dedicated to maintaining a high quality graduate program. While the quality of the faculty is excellent, their number is fewer than is needed to provide the best graduate training. The demands of the undergraduate program result in a diminished effort by the regular faculty to offer a variety of graduate courses. In addition, the ability to offer more courses in an academic year would also increase the options of the Master’s degree students. Therefore, a high priority for the Department should be recruitment of new faculty to replace those who have retired or left over the last several years that has resulted in a net loss of personnel. The Department adopted a very successful approach the past year by recruiting for new faculty in several disciplines simultaneously. While this resulted in an increased work load in the recruitment process, a number of very excellent candidates were identified. Thus it was possible to successfully recruit one of the top candidates among these various teaching and research specialties.

Until the Department can return to a more adequate number of tenure-track faculty, it should consider bringing in outside experts in certain disciplines not currently on the present faculty to augment the variety of graduate courses offered. The Bay Area has a wealth of scientific talent that could be utilized to teach a graduate course, even on a one-time basis. In addition to the
range of pharmaceutical and biotech companies, there are government labs such as NASA, Lawrence Livermore and Lawrence Berkeley where possible temporary or adjunct faculty could be recruited. Also, utilizing postdoctoral fellows from institutions such as Stanford, UC Berkeley and UC San Francisco might be another source of lecturers in a graduate course. There are usually a number of postdoctoral fellows whose career goal is to be in an academic institution and the teaching experience they would gain can be a valuable asset on their resume.

Staff

The Department is fortunate in having access to a number of well-trained support staff for both the office and the technical functions of the program. However, these are allocated to the College and not to the individual departments. Thus the demands are high in the college that supports a broad range of science and engineering programs. Within the specialized research facilities, Nuclear Magnetic Resonance, Mass Spectrometry and Scanning Electron Microscopy, there is a well-trained Ph.D. staff member to oversee operation and maintenance of equipment. However, for labs associated with the teaching program and those of individual research groups, there is only the one college electronics technician available to maintain and troubleshoot a large number and variety of instruments. Thus, individual faculty most often assume the responsibility for significant amounts of routine instrument maintenance. This detracts from their main duties of teaching in the undergraduate labs and directing graduate students in their research projects. Thus, a high priority for the Department should be an electronics or instrument technician who is capable of doing most of the repair and routine checks on instruments outside of the specialized research facilities.

Students

The impression gathered about the program, faulty, staff and general climate in the Department of Chemistry and Biochemistry were drawn from a one hour meeting I had with a group of about 15 graduate students during the second day of my visit. Overall the students projected a positive view of the Department and the graduate school experience. Uniformly they expressed praise for the faculty and they characterized the department staff as helpful.

The group of students was in most instances in remarkable agreement about issues that would improve the program or help the department and graduate students. Issues related to facilities, as stated above, were among the most frequently cited. These included the poor condition of the laboratories as well as the lack of adequate desk space for students while working on their research projects. In terms of equipment the need for an MS/MS system was cited as a high priority. There was a concern among the students who were not initially planning on going into a Ph.D. program after obtaining their Master’s that their chances for scholarships was considerably less than those who indicated a doctoral program as their next goal. Finally, among
those graduate students who were teaching assistants, there was a concern that their workload was too great for the salary due to heavy grading responsibilities.

**Curriculum**

The current graduate program in the Department of Chemistry and Biochemistry is basically well-formulated within the Title V Master’s degree requirements. The combination of course work with a strong emphasis on research resulting in a written thesis provides the student with capabilities well above those attained at the B.S. level. Students who complete the SFSU Master’s degree in Chemistry are well-prepared to move into responsible private sector positions or to enter doctoral or professional programs at high quality institutions. As in every academic endeavor, innovations and modifications in the current curriculum are valuable goals to improve the curriculum and adapt it to the changing professional needs in the field.

One change that the Department should consider is to drop the two-course core curriculum. This requirement is contrary to the approach that most modern graduate programs follow at both the Master’s and Ph.D. levels. The focus of graduate training is to gain specialized knowledge in a particular area of chemistry. This can be best accomplished through a more flexible program that allows students to tailor the courses they take to match the field of study as well as the research project for the thesis or culminating experience. Since modern science is becoming increasingly interdisciplinary, the removal of core courses allows students to take courses in associated subjects to enhance their expertise and credibility in the field of their research. The basics of chemistry are well-covered in the B.S. program, especially since most domestic colleges and universities are either accredited by the American Chemical Society or closely follow their recommended curriculum. For advanced study or employment in responsible positions in government and industry, this more tailored approach generally provides the M.S. graduate with the most desirable credentials. Some concern was also expressed by several faculty concerning the Level 1 and Level 2 writing requirements. It was felt that the Department and Program should have more control over how these requirements are fulfilled in order to better match the specialized needs of chemistry.

One change in the curriculum that the Department of Chemistry and Biochemistry has partially adopted is to move away from a formal thesis requirement and allow the culminating experience to be fulfilled by the publication of a manuscript in a peer-reviewed journal. Publications generally serve the student better whether seeking employment or moving on to further study in a doctoral or professional degree program. A publication is an easily verifiable and accessible document that has been reviewed by in most cases at least two experts in the field. This is in contrast to a thesis that has been reviewed, not necessarily by experts in the field but certainly scientifically competent faculty with basic knowledge about the research project. In addition, theses are often not as accessible or in a format that allows for assessment by potential employers or graduate school admission committees reviewing an applicant’s contribution to their scientific discipline. The only change that I would suggest for this process is that the Department formulates a well-defined set of rules outlining the conditions under which a publication is accepted for the culminating experience. For credibility, this should be at least a letter of acceptance from the editor and perhaps a requirement that the journal utilizes at least two peer reviews as part of the evaluation process.
Facilities

Facilities are a major problem for the Department. The building that houses most of the department’s activities is more than 30 years old. It was constructed at a time when the health and safety regulations were considerably less stringent that they are today. As a result, the building in its original configuration could not be built today because of current regulations. While some improvements and upgrades have been made over the last decade, there are still considerable deficiencies that are unlikely to be overcome unless the building is completely gutted so that modern ventilation and hood systems could be installed. In addition, there are serious plumbing problems that also would be difficult to correct simply through some type of remodeling project. Many drains have been identified by both faculty and students as inadequate with the fixtures being badly corroded.

However, it should be noted that some remodeling and renovation has taken place that provides enhanced capabilities for the graduate program. These would be the specialized research facilities having both personnel and equipment to conduct state-of-the-art scientific investigations. The infrastructure of these laboratories is generally quite adequate although the overall problems of ventilation and plumbing are basically the same or similar to those of the rest of the building. Therefore, while somewhat better than most of the teaching and research laboratories, the long-term sustainability of the structure even in these extensively remodeled facilities is not so certain.

The obvious solution to providing high quality programs in the Department of Chemistry and Biochemistry at both the graduate and undergraduate levels is to move them into a new building designed to meet the more stringent health and safety standards in force at present. More desirable is to construct a building exceeding those standards in anticipation of perhaps even more stringent requirements in the future. The current structure was designed at a time when only a modest amount of research was being done in the Department. All recently hired faculty are research active and the graduate program has grown considerably since the present structure was built. While the planning and eventual construction of a new building is typically beyond the control of the Department, College and even to some extent the campus, these deficiencies must continually be brought to the Chancellor’s office in order to have any chance of eventually constructing a new building in a reasonable time frame.

Final Comments

First, I would like to thank the department members, especially the Chair Dr. Jane DeWitt, for their time and efforts in this review, particularly in preparing a thorough and highly relevant self-evaluation. Several extended discussions with the Graduate Advisers were also very helpful in gathering a number of helpful insights into the program. It was both informative and refreshing to have an extended discussion with a group of graduate students in order to obtain their perspective on the graduate program and the department in general. I would like to that the members of the administration, in particular the Provost, the Dean of Graduate Studies, and the Dean of the College of Science and Engineering, for their perspectives on the Department, its graduate program and the long-term goals of the University.