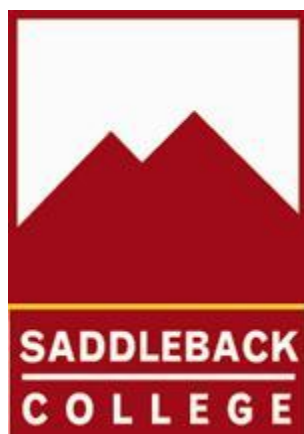


Saddleback College Program Review for Chemistry



Submitted on January 31, 2010

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Program Review Checklist

Date Completed	Action
09-02-09	Contact EPA Chair for orientation
10-02-09	Form Program Review Team (PRT)
10-19-09	Gather documents (Org Chart/Staffing Profile/SLO Assessment Forms/Data Sets)
10-02-09	Solicit input from faculty and students
	Determine if additional research is needed
08-31-09	Contact College Research Specialist if necessary
12-17-09	Write Program Review report
Spring 2010	Submit report to Dean and EPA Chair for review
Spring 2010	Report submitted to Academic Senate for acceptance
Spring 2010	Report submitted to the President and the Vice President of Instruction
Spring 2010	Report posted to the EPA website
TBD	Presentation to the Consultation Council

Section I: Program Overview

A. The Mission of the Program and its Link to the College's Mission, Vision, and Strategic Directions

A purpose of a systematic review of the Chemistry Program is to ensure quality and relevance, and to insure the effective use of resources. This program review is used for making judgments about the effectiveness of the Chemistry Program and to improve student learning. It is a means of ensuring that the Chemistry Program is effective and responsive to the local college community.

This document includes an overview of the Chemistry Program and key recommendations. The overview starts with the mission and goals of Saddleback College, the Math, Science and Engineering (MSE) Division, and the Chemistry Department. The main document describes and provides recommendations for the: curriculum, instruction, student success, staffing and resources, staff development, community outreach, and articulation and accreditation.

The mission of Saddleback College is to provide access to learning opportunities that promote student success; to foster intellectual growth, individual expression, and character development; and support a dynamic environment of innovation and collegiality. The vision of the school is that Saddleback College will be the first choice of students who seek a dynamic, innovative, and student-centered postsecondary education. Saddleback College will focus on a high rate of transfer; life-long learning; enhancing students' basic skills; and career technical education as necessitated by the changing economic, demographic and workforces characteristic of South Orange County.

The primary goal of Saddleback College is to provide a comprehensive postsecondary education and a full range of student services. To this end, the College will:

- ❖ Provide educational programs leading to the Associate in Arts and Associate in Science degrees.
- ❖ Provide a comprehensive, broad range of high-quality courses and programs to enable students to pursue their educational objectives and career goals.
- ❖ Provide a meaningful general education program including baccalaureate-level transfer and occupational curricula.

- ❖ Provide necessary developmental, remedial, and basic skills instruction so that students may be successful in their chosen course of study.
- ❖ Provide access for the community to the educational, cultural, and recreational resources of the College.
- ❖ Provide counseling and other support services which are responsive to the needs of the students.
- ❖ Provide opportunities in continuing education and community services, including courses for skills upgrading and retraining for professionals and life-long learning for older adults.

The goals of the Chemistry Department are extensions of the College's Mission, Vision, and Strategic Directions

- ❖ Provide a quality introductory lecture/laboratory chemistry course for students in Chemistry, Biology, Pre-Med, Engineering, Geology, Physics, Math, Computer Science, and related fields, who need basic knowledge and skills so that they may be successful in Chemistry 1A. We offer the algebra based Chemistry 3 – Fundamental Chemistry.
- ❖ Provide quality lower-division lecture/laboratory courses for transfer students in Chemistry, Biology, Pre-Med, Engineering, Geology, Physics, Math, Computer Science, and related fields. We offer four algebra based chemistry courses: Chemistry 1A and Chemistry 1B – General Chemistry, and Chemistry 12A and Chemistry 12B – Organic Chemistry.
- ❖ Provide quality supplemental chemistry courses to increase student retention rate and transfer rate to universities. We offer Chemistry 106 – Basics of Chemistry, to be taken concurrently with Chemistry 1A, and Chemistry 299 – Computer-Assisted Chemistry, which can be taken concurrently with Chemistry 3, Chemistry 1A, or Chemistry 1B.
- ❖ Provide a quality lower-division lecture/laboratory chemistry course for allied health majors and all other majors requiring a one semester course in general, organic, and biochemistry, which has no prerequisite requirements. We offer Chemistry 108 – Introduction to General, Organic, and Biochemistry.
- ❖ Increase student retention rate and transfer rate to universities by offering quality instruction with a diverse schedule.

B. Historical Background and Unique Characteristics of the Program

The Saddleback College Chemistry Program offers preparatory and undergraduate level chemistry courses required by students seeking degrees or certificates in related science fields. The majors courses include six full hours of laboratory per week, providing students with extensive hands-on experience. A unique characteristic of the Chemistry Program at Saddleback College is that we offer small lecture/laboratory sections, where maximum enrollments are 28 students per section. In

addition, accredited instructors teach both the laboratory and lecture portion of each course. The small class sizes allow the students more access to their instructor, in addition to the five office hours per week that the full-time faculty already provides.

The Chemistry Program also has near state-of-the-art equipment available to the students. Unique to Saddleback College is that chemistry students will get hands-on experience during the laboratory sessions with the nuclear magnetic resonance spectrometer, Fourier transform infrared spectrophotometer, high performance liquid chromatograph, gas chromatograph, ultraviolet/visible spectrometer, gas chromatograph/mass spectrometer, refractometer, polarimeter, and fiber optic spectrometer with computer interface for data acquisition. The Chemistry Program also has a dedicated computer lab, used for molecular modeling using the Spartan software, data analysis using software such as Excel and LoggerPro, and to access internet resources.

C. Progress Since the Last Program Review

The 2004 Chemistry Program Review produced ten recommendations that the department, division, and school should address over the next five years. Eight of the ten recommendations have been addressed and rectified.

- ❖ The first recommendation made was to hire a full-time organic chemistry instructor. Since Dr. James Wright was hired as Dean of the SME Division, the Chemistry department had gone four years with adjunct faculty teaching our organic chemistry classes. With the hiring of Dr. William Alston to teach and run the organic chemistry program, this recommendation was fulfilled.
- ❖ The second recommendation made was to hire a full-time general chemistry instructor. The department had documented the increase in demand for general chemistry classes, and had predicted this demand to continue. Over the next three years the predictions proved to be correct. The college prioritized the hiring of a new general chemistry instructor, and the district funded the position. With the hiring of Dr. Christina Abel, this recommendation was fulfilled.
- ❖ The third recommendation was to be able to add Chemistry 3 as a prerequisite for Chemistry 1A, to go along with the current Math 253 prerequisite. However, the computer system used for registration by the Admissions, Records, and Enrollment Services was unable to enforce more than one prerequisite for any single course. Our recommendation was for the Admissions, Records, and Enrollment Services to develop or purchase a computer system that would be able to enforce more than one prerequisite per course. While this goal has not been met, the chemistry department decided to address this

- recommendation by changing the single prerequisite for Chemistry 3 from Math 251 to Math 253, and changing the single prerequisite for Chemistry 1A to Chemistry 3, or the passing of the ACS California Chemistry Diagnostic Test. Now, students enrolling in Chemistry 1A have completed Chemistry 3 and Math 253, or their equivalents.
- ❖ The fourth recommendation was to supply each lecture room, lab room, and the Chemistry Computer Lab with a permanent ceiling mounted projector system and an accompanying computer. All rooms are now supplied with a permanent ceiling mounted projector system and an accompanying computer.
 - ❖ The fifth recommendation was to recarpet the three chemistry lecture rooms and the Chemistry Computer Labs. All rooms have now been recarpeted.
 - ❖ The sixth recommendation was to supply shut off switches for the fume hoods in all laboratory rooms to allow for discussion and lecturing to occur in these rooms without the noise of the fans interfering. Money is needed to install the shut off switches and has not yet been appropriated.
 - ❖ The seventh recommendation was to repair the vacuum lines in SM 208 and SM 226 that do not operate. Our organic chemistry experiments are performed in SM 208, and without vacuum lines our organic chemistry students are unable to do vacuum distillation or vacuum filtration. Without a working vacuum line in SM 226, chemistry senior laboratory technicians must wait until classes are through in one of our other laboratory rooms to use vacuum. Maintenance and Operations believe that when the building settled, vacuum lines in the concrete were damaged. Trouble shooting would involve breaking out concrete to find the damaged lines, and the cost would be high, therefore money has not been appropriated.
 - ❖ The eighth recommendation was for the continuing need for acquisition or replacement of laboratory equipment, tables, cabinets, a fume hood, and especially analytical instruments for the organic chemistry courses. Under the direction of chemistry senior technician Ms. Sara Sheybani, the systematic replacement of old laboratory equipment has taken place, providing the laboratory rooms with newer equipment. This includes basic equipment such as clamps and burners, but also more expensive equipment such as balances, centrifuges, heat guns, vortex mixers, stirring hot plates, and mel-temps. She has also spearheaded the remodeling and reorganizing of the Chemistry Stockroom for efficiency and safety. This includes purchasing new tables, cabinets, and an industrial stainless steel dishwasher capable of a deionized water rinse. Under the direction of the Chemistry Computer Lab manager Mr. Bruce Lee, more laptop computers have been purchased to create a complete class set for use in laboratory classes, as well as a class of fiber optic spectrometers. Under the direction of Dr. William Alston, the organic chemistry program has

- acquired two gas chromatographs, two infrared spectrometers, a polarimeter, and a gas chromatograph/mass spectrometer.
- ❖ The ninth recommendation was for the acquisition of computers for the Chemistry Computer Lab powerful enough to run sophisticated software such as Spartan Molecular Modeling. The Chemistry Computer Lab is now equipped with such computers.
 - ❖ The tenth recommendation was to add courses to facilitate growth. We recommended adding a sixth Chemistry 1A class and a second Chemistry 12A class for the fall, a second Chemistry 12B class for the spring, and a second Chemistry 1B class in the fall, and a fifth Chemistry 1A class in the spring. All of these courses are now being offered.

D. Discussion of How SLOs Have Been Utilized by the Program

Student Learning Outcomes are now documented in the course curriculum. The chemistry faculty uses a variety of methods to assess students and determine if the Student Learning Outcomes are met. The methods include: frequent quizzes, exams, and homework assignments with embedded questions, the keeping of laboratory notebooks, and laboratory write-ups. Results are used to constantly monitor the student learning in our courses, and to adjust instruction to continually improve student success.

E. Current Strengths, Opportunities, and Challenges

The Chemistry Program strives to maintain the integrity of Saddleback College academic standards and achieve consistency in instruction amongst courses offered. The methods used to maintain academic integrity include:

- ❖ All faculty members follow the course outline as documented in the curriculum. The department chair and division dean have the responsibility of insuring that all faculty follow the curriculum.
- ❖ All same-section courses use the same textbook. Chemistry 108 uses General, Organic, and Biological Chemistry: An Integrated Approach by Raymond; Chemistry 3 uses Introductory Chemistry by Zumdahl; Chemistry 1A and Chemistry 1B use Chemistry by Zumdahl; and Chemistry 12A and Chemistry 12B use Organic Chemistry by Bruice.
- ❖ The same-course sections perform comparable laboratory experiments. Laboratory experiments are either purchased as a laboratory manual from the Saddleback Bookstore, handed out as laboratory packets by the instructor, or posted on line.
- ❖ For the most part, all of the chemistry faculty members use the same assessment tools. The student grades are based on three to five

multi-chapter exams, frequent quizzes, laboratory report forms, and assigned homework problems.

Technology is widely used in the Chemistry Program, and chemistry faculty members are encouraged to use and experiment with new and innovative teaching methods. Uses of innovation and technology include:

- ❖ Course information such as syllabi, homework problems, tutorials, pretests, and course counseling can be found on class websites or on Blackboard. A Chemistry Department web page, providing course, department, and counseling information, is maintained and updated frequently by the Ms. Sara Sheybani.
- ❖ Audiovisual presentations are done in lecture and laboratory periods via various formats such as the internet, DVD's, or PowerPoint.
- ❖ Students utilize the computers in the Chemistry Computer Lab to take quizzes, do molecular modeling, use data analysis software such as Excel and LoggerPro, and to access internet resources. The Chemistry Computer Lab is also used for students to participate in Chemistry 299, in which students complete sets of computerized practice problems to improve their skills and receive credit.
- ❖ Chemistry students use laptop computers and high-end instrumental laboratory equipment, giving them a laboratory experience that exceeds that of most four-year universities. In the Chemistry 1A and 1B courses, students use LabPro multi-use sensors that interface directly with the laptop computers. The laptop computers are also used for data collection and analysis. Instrumental equipment used by the students in Chemistry 12A and 12B, include the nuclear magnetic resonance spectrometer, Fourier transform infrared spectrophotometer, high performance liquid chromatograph, gas chromatograph, ultraviolet/visible spectrometer, gas chromatograph/mass spectrometer, refractometer, and polarimeter. Many of these are computer interfaced instruments, and all are used by students here in a hands-on manner. This is in contrast to the more typical practice at many other colleges of restricted use of such instruments by lower-division students, and student exposure to them, if at all, by instructor demonstrations or simulations.

An opportunity to allow our students and the local community to hear world renowned scientists speak at Saddleback College is being realized through the effort of Ms. Sara Sheybani and Dr. Jim Zoval. Using money obtained through the competitive grant process, the Chemistry Program has teamed with the Biology Program to host a Science Lecture Series at Saddleback College. One Nobel Prize laureate and one National Medal of Science recipient are already scheduled to speak.

The biggest challenges that the Chemistry Program may face over the next five years are obtaining sufficient help in the Chemistry Stockroom to offer more laboratory classes, funding of necessary laboratory equipment, and obtaining school support to fund the administering of the ACS California Chemistry diagnostic Exam, our General Chemistry assessment.

Section II: Review Report

A. Faculty and Staff

The Chemistry Program is staffed by six full-time professors and several associate faculty members. Thirteen to fourteen courses per semester are taught by the full-time professors, and approximately four to six courses per semester are taught by the adjunct faculty members. The Chemistry Program's teaching operations are supported by two full-time technical support staff and one full-time instructional programmer/analyst (computer lab manager).

B. Curriculum and Instruction

The Saddleback College Chemistry Program is structured so as to be similar to programs offered at 4-year colleges and universities (e.g., University of California and California State Universities). The majority of our students transfer to the UC and CSU systems, so the Chemistry Program should be compatible with programs at these institutions.

However, unlike the courses offered at major universities and some other 2-year colleges, Saddleback College offers small class sizes. As an example, the chemistry courses offered at the UC and CSU campuses have large lectures with several smaller laboratory sections. The lecture sections, which can have up to 400 students, are given by professors. In many cases, the laboratory sections are administered by graduate students. At Saddleback College, we offer small lecture/laboratory sections. Our maximum enrollment is 28 students per section. Furthermore, accredited instructors teach both the laboratory and lecture portion of each course. The smaller class sizes allow the faculty members to become better acquainted with their students and to focus on individual learning objectives and needs. Many of our transfer students praise the quality of education they received at Saddleback College.

The Chemistry Program has near state-of-the-art equipment available to the students. Equipment is used by students for hands-on instruction during the laboratory sessions and by instructors for demonstrations.

Table 1 lists the courses offered in the Chemistry Program, the date of the most recent course outline update, and the transferability of the courses to the UC and California State University systems. Saddleback College offers an Associate of Science Degree in Chemistry.

Table 1 – Chemistry Courses Offered at Saddleback College

Course	Course Outline Update Date	Degree Support and Transferability
Chemistry 108	Fall 2009	AA General Education breadth requirement CSU Area B1
Chemistry 3	Fall 2005	AA General Education breadth requirement CSU Area B1 IGETC Area 5
Chemistry 1A	Fall 2005	AA General Education breadth requirement CSU Area B1 IGETC Area 5 Majors support
Chemistry 1B	Fall 2008	CSU Area B1 IGETC Area 5 Majors support
Chemistry 12A	Fall 2005	CSU Area B1 Majors support
Chemistry 12B	Fall 2008	CSU Area B1 Majors support
Chemistry 106	Fall 2005	
Chemistry 299	Fall 2005	

Chemistry 108 is a general education course that satisfies the Saddleback AA breadth requirement and CSU (area B1) transfer requirement. Chemistry 3 is a general education course that satisfies the Saddleback AA breadth requirement, the IGETC (area 5) transfer requirement, and CSU (area B1) transfer requirement. Chemistry 1A, Chemistry 1B, Chemistry 12A and Chemistry 12B support specific Baccalaureate and AA Degree programs. Chemistry 1A satisfies the Saddleback AA breadth requirement. Chemistry 1A or Chemistry 1B satisfies the IGETC (area 5) transfer requirement. Chemistry 1A, Chemistry 1B, Chemistry 12A, or Chemistry 12B satisfies the CSU (area B1) transfer requirement. The transferability of the chemistry courses are detailed in the Catalog of Classes.

Prerequisites for Chemistry courses are enforced during registration. Students who have taken prerequisites at other institutions must fill out a matriculation form which is then reviewed and signed by faculty, the Chair of the Chemistry Department or the Division Dean. The prerequisites and corequisites for the chemistry courses are summarized in Table 2.

Table 2 – Chemistry Courses Prerequisites

Course	Corequisite	Prerequisite
Chemistry 108	None	None
Chemistry 3	None	Math 253
Chemistry 1A	Chemistry 106	Chemistry 3 ¹
Chemistry 1B	None	Chemistry 1A
Chemistry 12A	None	Chemistry 1B
Chemistry 12B	None	Chemistry 12A
Chemistry 106	Chemistry 1A	None
Chemistry 299	Chemistry 3, 1A or 1B	None

1 The prerequisite of Chemistry 3 is waived if the student passes the ACS California Chemistry Diagnostic Test

The Chemistry courses offered at Saddleback support other programs. Examples of supported programs are given in Table 3. Several non-physical science majors (Baccalaureate level) must take the Chemistry 1 and 12 courses. As an example: biology majors must take Chemistry 1 and 12; engineering majors must take all or part of the Chemistry 1 sequence; geology majors must take all or part of the Chemistry 1 sequence (depending on the university the student is transferring to). The Chemistry 108, and Chemistry 3 courses are general education courses which also serve as a technical elective for some majors and K-12 teachers.

Table 3 – Examples of Programs Supported by the Chemistry Program

Chemistry Course	Other program support at Saddleback	Examples of majors supported at Universities¹
Chemistry 108	- Nursing, med-tech, meets the general education laboratory science requirement	Nursing, breadth course for general education
Chemistry 3	- Meets the general education laboratory science requirement	Breadth course for general education
Chemistry 1A, 1B	- AA degrees in Biology, Engineering, Geology, and Oceanography - Chemistry 1A meets the general education breadth laboratory science requirement	Biology, Engineering, Geology, Oceanography, Pre-Medical, Pre-Dental, Pre-Veterinarian, Pre-Pharmacy, Physical Therapy, Chiropractor (et al.), breadth course for general education
Chemistry 12A, 12B	- AA degree in Biology	Biology, Pre-Medical, Pre-Dental, Pre-Veterinarian, Pre-Pharmacy, Physical Therapy, and Chiropractor (this is not a complete list)

1. Not a comprehensive list.

Because of the large number of students applying to the Saddleback College Nursing Program, there is a high demand for Chemistry 108, which is required for biology courses that are prerequisites for the Nursing Program. Based upon Priority Add List data, the Chemistry Program could fill two additional Chemistry 108 classes each semester.

Similarly, because the majors' biology classes now have Chemistry 1A as a prerequisite, there is a high demand for Chemistry 3 and consequentially, Chemistry 1A. Priority Add List data indicates that the Chemistry Program could fill two additional Chemistry 3 classes each semester, and we predict two more Chemistry 1A classes each year.

C. Student Success

Table 4 provides data for the enrollment in chemistry courses, the average yearly retention rates, and the average yearly successful completion rates for the Chemistry Program from 2004/05 through 2008/09. Enrollments in chemistry courses remained steady, at about 950 students per year from 2004/05 through 2007/08. However, long wait lists for Chemistry 1A, 1B, 3, and 108 classes indicated that more sections should be offered. When extra sections were added in the 2008/09, enrollment spiked to 1183 students, an increase of 24%.

Over the five-year period from 2004/05 through 2008/09, the Chemistry Program yearly retention rates expressed as percents, were in the high eighties, and yearly success rates were in the mid seventies. On average, the yearly retention rates were five percent higher than yearly retention rates for the previous five-year period, and the yearly success rates were three percent higher than yearly success rates for the previous five-year period. These results have been due to instructors striving to improve the retention and success rates.

Table 4 – Chemistry Program Enrollment, Success and Retention

	Academic Year				
	2004/05	2005/06	2006/07	2007/08	2008/09
Total Enrollment in Chemistry Courses	951	936	956	962	1,183
Average Course Term Retention Rate	86%	88%	86%	88%	89%
Average Successful Course Completion Rate	74%	75%	73%	75%	73%

D. Facilities, Technical Infrastructure, and Resources

The chemistry lecture classes are held in Science Math (SM) 204, 205, and 206, and the Chemistry Computer Lab occupies Science Math (SM) 207. All four lecture rooms have a permanent ceiling mounted projector system, each with an accompanying computer.

The chemistry course laboratories are taught in Science Math (SM) 208, 240, 241, and 242. All four laboratory rooms have a permanent ceiling mounted projector system, each with an accompanying computer. Our labs are serviced by the Chemistry Stockroom, Science Math (SM) 223, 224, 226 and 228.

Instrumental equipment used by the students in Chemistry 12A and 12B, include the nuclear magnetic resonance spectrometer, Fourier transform infrared spectrophotometer, high performance liquid chromatograph, gas chromatograph, ultraviolet/visible spectrometer, gas chromatograph/mass spectrometer, refractometer, and polarimeter. Many of these items are computer-interfaced instruments, and all are used by students here in a hands-on manner.

Many computer applications are used in the Chemistry Program. Due to the efforts of Dr. Curt McLendon, the Chemistry Department has been using computers as an instructional tool since the 1980's, well before the vast array of disciplines that use them today. Chemistry 299 is a computerized course that may be taken concurrently with Chemistry 1A, 1B, or 3. Working in the Chemistry Computer Lab, students complete sets of computerized practice problems to improve their skills and receive credit. The lab contains 24 computers with 3.4 GHz processors, 1.0 GB RAM and 75 GB hard drives. Students also use the Chemistry Computer Lab to take quizzes, perform data analysis using software such as Excel and LoggerPro, perform molecular modeling using the Spartan software, and to obtain access to internet resources. Several professors provide course content through class websites or Blackboard, as well as using commercial on-line homework systems such as WebAssign.

The Chemistry Program has other computer applications that are used directly in the chemistry laboratory rooms. The program uses 30 LabPro sensors along with 30 laptop computers to collect data for thermodynamic, spectroscopic, and colligative property experiments in General Chemistry laboratories.

Chemistry instruction is inherently supply-intensive and equipment-intensive. Our current supply and equipment budgets, when augmented by funds through the competitive equipment committee, have been adequate to provide the supplies and equipment necessary to run a

comprehensive laboratory program. State of the art laboratory equipment and computers used by our chemistry students has been purchased through funds made available from the technology committee.

Section III: Needs Assessment and Annual Update

A. Statement of Program's Current Situation (maximum of 3-4 sentences)

The Chemistry Program is staffed by six full-time faculty members, and offers preparatory courses (Chemistry 3), courses for health pre-professionals (Chemistry 108), courses for science majors (Chemistry 1A, 1B, 12A, 12B), and supplementary courses (Chemistry 106 and 299). Three classified staff members support the program: two chemistry senior technicians and a senior programmer/analyst (computer lab manager). Because long Priority Add Lists exist for Chemistry 1A, 3, and 108, extra sections of these courses are needed, and this will require additional personnel in the chemistry stockroom to adequately prepare an increased number of laboratory experiments. The Chemistry Program is well-supplied with up-to-date instrumentation, but is in need of a microwave reactor, and a replacement nuclear magnetic resonance spectrometer. Additional equipment that would keep the department on the leading edge of experimental work would be a single crystal x-ray diffractometer, a real time PCR, and an atomic absorption spectrometer.

B. Human Resource Needs

The Stockroom staff is working at full capacity to service the 18 to 19 laboratory sections we are offering each semester. With the Chemistry Program offering this number of sections, our senior lab technicians often need overtime to complete this number of laboratory preps. An immediate recommendation is to increase the amount of student help or project specialists allotted to the Chemistry Program.

Long Priority Add Lists have developed for Chemistry 1A, 3, and 108, and more sections of these courses need to be added. Full-time faculty members are available to teach the extra sections, however, our stockroom staff cannot service an increase in the number of sections offered. Our recommendation is to hire one half-time chemistry technician, which would allow us to offer more laboratory courses to meet our student demand.

C. Instructional/Service Needs

The Chemistry Department uses the ACS California Chemistry Diagnostic Test, which we call The Chemistry Challenge Exam, to determine if a student has enough chemistry knowledge that would justify waiving the Chemistry 3 prerequisite for Chemistry 1A. The Chemistry Challenge Exam is currently administered by the Chemistry Department. Mr. Bruce Lee, the Chemistry Computer Lab Manager, has loaded the exam on the computers in the Chemistry Computer Lab. He then maintains an informational web site concerning the Chemistry Placement Exam, schedules students to take the exam, proctors the exam, and reports the results to Admissions, Records, and Enrollment Services. At other community colleges that offer the same exam as a placement tool for General Chemistry (such as Orange Coast College and Santa Monica College), the administration of the exam is handled by the school's Matriculation Office. The stated purpose of matriculation is to provide orientation, assessment testing, and group advisement to new or returning students. The most important component of matriculation is the assessment testing. Our Matriculation Office currently administers the assessment testing for math, English, and reading. It is our recommendation that the Saddleback College Matriculation Office administer the Chemistry Challenge Exam because their purpose is to provide assessment testing. We propose that Saddleback College fund the Matriculation Office in an appropriate fashion so that they can also administer the Chemistry Challenge Exam.

D. Research Needs

E. Technical, Equipment and Other Resource Needs

With a future increase in Chemistry 1A, 3, and 108 class offerings, a comparable increase in funding to provide for the laboratories of these courses will be needed. Reliable funding for purchases of minor equipment which is separate from our supply account should be provided. To successfully produce a quality laboratory program, the supply budget must be supplemented with competitive funds from the equipment committee and technology committee.

The following are equipment the Chemistry Program needs to replace or purchase in order to keep the program current:

- ❖ The refurbished nuclear magnetic resonance spectrometer, used in the organic chemistry program for eight years, is no longer in working condition. This is a vital piece of instrumentation for the organic chemistry program, and must be replaced. Our recommendation is to purchase a new nuclear magnetic resonance spectrometer.

- ❖ The gas chromatograph, used in the organic chemistry program, is in need of a new controller. Our recommendation is to purchase a new controller for the gas chromatograph.
- ❖ Recent technology has been to use microwaves as an energy source to perform chemical reactions, proving an invaluable tool for performing chemical reactions in a shorter period of time. To remain on the leading edge in the field of chemistry, a microwave reactor is needed in order to allow our students to use the latest technology. Our recommendation is to purchase a microwave reactor.
- ❖ Since new organic reactions involve asymmetric synthesis, chiral molecules are produced. To experimentally verify the structure of these compounds would require a single crystal x-ray diffractometer. This instrument would also be valuable in the analysis of metal-ligand complexes in general chemistry. Our recommendation is to purchase a single crystal x-ray diffractometer
- ❖ Much of general chemistry laboratory curriculum deals with the analysis of elemental components in samples. Atomic absorption spectroscopy is one instrumental technique that can be used to analyze metals such as chromium and lead in samples. This type of analysis would have environmental applications, and our recommendation is to purchase an atomic absorption spectrometer.

F. Facilities Needs

With the Chemistry Program offering an increased number of sections over the past five years, the four laboratory rooms in the SME building are close to maximum utilization. If additional sections are to be added for Chemistry 1A, 1B, 3, and 108, an additional laboratory room would provide the needed facilities to accommodate this increase. This extra chemistry laboratory room has been included in the plans for the new Science Building at Saddleback College. The building is scheduled to be built by the district, and it is our recommendation to make the new Science Building a high priority.

The chemistry department worked very closely with Glen Berry of Design for Science, as well as with the original architectural team, in designing the layout of the laboratory rooms and service areas for the new science building. For the new science building, these design elements must remain intact, and the building must contain ample prep space in the stockroom. The chemistry laboratory facilities recently completed at Irvine Valley College deviated so much for the original design that the final product lacked enough storage space for the student equipment, provided insufficient venting for harmful organic fumes, and placed the chemistry stockroom so far away from the laboratory rooms that the senior lab technicians have to cart hazardous chemicals and equipment through

public walkways filled with students. It is our recommendation that the chemistry department work closely with builders to insure that these important design components go through to completion.

Plan for the new science building does not include a chemical storage building. We currently store the majority of the hazardous chemicals in a chemical storage building, adjacent to the current Science/Math Building, to prevent these materials from being stored near people. Without a chemical storage building for the new science building, additional space will have to be allotted in the new science building to store these hazardous chemicals, and people – staff and students – will risk exposure to them. It is our recommendation that a chemical storage building be built along with the new science building, and in a convenient location as to minimize potential contact between the chemicals and individuals. The laboratory program in chemistry cannot function without the equivalent type of hazardous storage space that we require now.

G. Marketing and Outreach Needs

Chemistry department members routinely participate in Senior Day and High School Family Night activities. Ms. Sara Sheybani has prepared a department brochure, which has been handed out to prospective students interested in the chemistry program.

Under the direction of Ms. Sara Sheybani and Dr. Jim Zoval, the chemistry department has teamed with the biology department to host a Science Lecture Series at Saddleback College for students and the general public. One Nobel Prize laureate and one National Medal of Science recipient are already scheduled to speak.

The chemistry department also coordinates the selection and presentation of the Harold Friedemann Memorial Chemistry Scholarship through the Science Scholarship Foundation. .Scholarship awards of up to \$15,000 are available to eligible Saddleback students for use after they transfer to a four-year college or university. The Foundation, instituted by a former Saddleback student who thought highly of chemistry in general and Saddleback's Chemistry Department in particular, awards scholarships to encourage and assist chemistry students in pursuing careers in chemistry.

Section IV: Appendices

- A. Program Organizational Chart**
- B. Five-Year Program Staffing Profile**
- C. Data Sets**
- D. Others**