College of San Mateo

Program Review Submission

Instructional Program Review

Program Name: **Chemistry**
Program Contact: **Lawrence, Yin Mei**
Academic Year: **2013-2014**
Status: **Submitted**

1. Description of Program

Provide a brief description of the program and how it supports the college's **College Mission and Diversity Statements**, **Institutional Priorities, 2008-2013**, **5 in 5 College Strategies, Spring 2011**, and other **Institutional Program Planning** as appropriate.

The Chemistry program offers the first two years of chemistry courses to serve two major tracks:

1) The first two years of chemistry required for a baccalaureate in various majors such as biology, chemistry, and engineering.

2) Various chemical courses required for certificate or two year programs such as nursing, dental assisting, and lab technologist.

Which track a student will take depends on their educational goals.

Both tracks align with the Board of Trustees' Core Value of a Student-Centered Mission, as well as College of San Mateo's Mission Statements.

They also support the college's mission and diversity statements: we are continually engaged in developing and utilizing new teaching methodology to improve student success and promote academic excellence. Examples of efforts in these areas include but are not limited to introduction of Reading Apprenticeship, efforts to seek funding and other resources to introduce supplemental instruction, team evaluation of laboratory manual and development of new laboratory experiments, introduction of teaching video for key organic chemistry techniques, active involvement in the integrated learning center to provide tutoring help to students and overhauling data acquisition system in our laboratories.

Faculty are also engaged in promoting relevant services: we have been working closely with third party providers such as Sapling learning, McGraw Hill and Pearson publishing to identify and try out online homework support/learning systems for our students. We also work with CSM learning center in identifying and supporting tutors there.

Efficient use of resources is another area we focused on this past year. Recognizing the increasing demand on our laboratory technician by different instructors offering different laboratory experiments – we are beginning to review all experiments offered and are aiming to narrow them down to a standard set of experiments which instructors may choose from. This makes technical support more efficient and provide more consistency to different sections and classes of the same course. At the same time, we do recognize and respect each instructors' academic freedom and so provisions are included for individual preferences as well. One outcome from this effort to maximize efficiency is the need for addition funding for laboratory equipment: a number of experiments were introduced not for pedagogic reasons; but because did not have enough glassware for all the sections!

With respect to fiscal stability, the load for chemistry always exceeds 500.

Faculty from the department participate in institutional dialogue by participating in student success initiatives (RA) and outreach (Family Science Day)

Courses offered in chemistry include:

Chem 192 Elementary Chemistry – a first introductory course in chemistry for non-science majors, remedial preparation or some certificate programs. Prereq: Math 110 or one semester algebra. Recommended: enroll concurrently in MATH 115 or MATH 120 or 122.

Chem 210 General Chemistry I – first semester general chemistry for science majors. Prereq: MATH 120 with a grade of C or higher. Recommended: CHEM 192 with a grade of C or better or equivalent; eligibility for ENGL 838/848 and one course in physics.

Chem 220 General Chemistry II – second semester general chemistry for science majors. Prereq: Chem 210 with a grade of C or higher.

Chem 231 Organic Chemistry I – first semester organic chemistry for science majors. Prereq: Chem 220 or 225.

Chem 232 Organic Chemistry II – second semester organic chemistry for science majors. Prereq: Chem 231

Chem 250 Analytical Chemistry Quantitative Analysis – Introduction to chemical analytical procedures. Prereq: Chem 220 with a grade of C or higher.

Chem 410 Health Science Chemistry I – a first introductory course in general chemistry for some health professions. Prereq: None Recommended: MATH 110 or one semester course of algebra, eligibility for ENGL 848.

Chem 420 Health Science Chemistry II – a first introductory course in organic/biochem for some health professionals. Prereq: Chem 410 with a grade of C or higher.

Chem 680 MA (CHEM 100) – Survey of Chemistry

(Starting Spring 2015) – an introductory course Chemistry for non-Science Majors covering key chemistry concepts. Mathematical problem-solving methodology is applied throughout the course.

2. Student Learning and Program Data

A. Discuss Student Learning Outcomes Assessment

Reflect on recent SLO assessment results for courses and degrees and certificates offered by the program. Identify trends and discuss areas in need of improvement.

The Chemistry department is current with our SLO assessments in all courses. There is close coordination and collaboration between fulltime and part-time faculty in designing, implementing and reviewing our SLO process. In addition, our SLO assessment schedule master plan, SLO statements as well as assessment resources and data are all centrally stored and assessable on our departmental WebAccess.

Below is our results and reflections on SLO assessments on all chemistry courses.

Chem 210 was assessed in Fall 2010. This courses SLOs were assessed using the performance on three questions under examination conditions and the assessment of laboratory performance. A score of a C or above was considered to be meeting the SLO requirement. SLO 1 was achieved with 93% of students meeting or exceeding the SLO requirement. SLO 2 was achieved with 98% of students meeting or exceeding the requirement. SLO 3 was achieved with 70% of students meeting or exceeding the requirement and SLO 4 had 100% of the students meeting or exceeding the requirement. At the time of this assessment Chem 192 was a prerequisite for Chem 210. Since then the prerequisite of Chem 192 has been dropped and it was observed that a trend where students were less prepared for the Chem 210 curriculum was threatening student success. As of Fall 2014 Chem 192 was reinstated as a prerequisite for the Chem 210 course.

Chem 220 - This course's SLO's were assessed in spring 2009 using the performance on three questions on the final exam. The student had to score at least a C on the question to consider it as meeting the SLO criterion. The question for SLO 1 had 84.1 % of the 63 students taking the final exam scoring at least a C. The question for SLO 2 had 75.5% of the 63 students taking the final exam scoring at least a C. The question for SLO 3 had four parts. Part A had 87.5% of the 63 students taking the final exam scoring at least a C. Part B had 90.9% of the 63 students taking the final exam scoring at least a C. Part C had 93.2% of the 63 students taking the final exam scoring at least a C. Part D had 89.8% of the 63 students taking the final exam scoring at least a C. The chemistry department feels that no action is required at the present time. It should be noted that this course will be assessed again in spring 2014.

Chem 250 This course's SLO's were assessed in fall 2009. The student had to score at least a C on the lab report for SLO 1 and 4, questions on the final exam for SLO 2 and 3, lab notebook for SLO 5 and received at last a C on all of the written lab reports for SLO 6 to consider the assessment as meeting the SLO criterion. For SLO 1, all 15 students received an A on the lab report. For SLO 2 and SLO 3, all 15 students scored at least a B on these questions on the final exam. For SLO 4, 14 out of the 15 students received an A on this lab report indicating that they were capable of preparing standards and using a calibration curve. The 15^{th} student was absent on day 1 of the lab but on day 2 of the lab received an A for that portion of the lab indicating the student was also were capable of preparing standards and using a calibration curve. For SLO 5, all 15 students earned an A on their lab notebook. For SLO 6, All of the students received at least a C on all on the written lab reports and by the second half of the semester all of the students were earning at least a B on the written lab reports. All 6 of the SLO's met the criterion. The chemistry department feels that no action is required at the present time. It should be noted that this course will be assessed again in fall 2014.

CHEM 192 was assessed in Fall 2011. Students' attitudes and perceptions were assessed using a Likert-type scale applied to quick write responses. 89% of students agreed or strongly agreed that requirements for SLO1, SLO2, and SLO3 were met or exceeded. The chemistry

department feels that no action is required at the present time. This course will be assessed again in Fall 2014.

CHEM 231 was assessed in Fall 2011 and is due for assessment again Fall 2014. There were five SLO statements and these were assessed by a range of written tests taken throughout the semester as well as an end-of-term laboratory practical exam. All assessments were instructor graded. In summary: success criteria was set at 75%-80% of students passing with a grade C or better. All criteria were exceeded (ranging from 82% - 92% pass rate). No modification recommended for the Fall 2014 assessment cycle.

CHEM 232: All 6 SLO's were assessed during Spring 2013 on multiple dates: 5/22/13 – SLO 1 & SLO3; 4/17/13 – SLO2; 2/22/13 – SLO 4; 1/25/13 – SLO 5. Assessment methods included multiple choice questions, short answers and questions involving mathematical analysis. All assessments were instructor graded. In all cases, proportion of student ranged from 80 – 86%). Therefore, all SLO goals were met and no modification recommended to the SLO's.

CHEM 410 assessment will continue to use a student attitudes and perceptions' instrument using a Likert-type scale. SLOs were assessed for all chemistry 410 courses in 2011 and will be reassessed 2014. Here are the SLOs for CHEM 410:

All students reported that they were better able to understand the nanoscale particle nature of matter (SLO 1).

Students indicated that they were better able to represent the chemical elements and chemical compounds after having taken this class: 93% agreeing/highly agreeing (SLO 2).

Students indicating that they are more able to work quantitative problems involving concentrations, and other chemical calculations after having taken this class: 80% agreeing/highly agreeing (SLO 3).

We are pleased that each of these three SLOs' of CHEM 410 demonstrated such high success rates. Efforts are ongoing to ensure that the materials taught in these classes align with student needs across all three campuses of the district. As such, efforts are underway to rename this class.

CHEM 420 assessment will continue to use a student attitudes and perceptions' instrument using a Likert-type scale. SLOs were assessed for all chemistry 410 courses last spring. Here are the SLOs for CHEM 420:

Students indicating that they are better able to represent chemical reactions and biochemical mechanisms: 94% agreeing/highly agreeing.

Students indicating that they are better able to solve quantitative problems involving behavior and reactions of various chemical substances: 78% agreeing/highly agreeing.

Students indicating that they are more familiar with organic functional groups and their reactive behaviors as well as the complex biologically relevant chemical systems: 89% agreeing/highly agreeing.

We are pleased that each of CHEM 420's three SLOs demonstrated such high success rates. Still greater care in the presentation of labs is needed. We are in the process of developing a WebAccess portal page that will provide our students with greater information to help them succeed.

B. Student Success Indicators

1. Review **Student Success and Core Program Indicators** and discuss any differences in student success indicators across demographic variables. Also refer to the **College Index** and other relevant sections of the **Educational Master Plan: Update, 2012**, e.g., Student Outcomes and Student Outcomes: Transfer. Basic Skills programs should also refer to **ARCC** data.

The student success indicators for the 2012-2013 academic year were 76.2% success and retention of 86.9%. These numbers were consistent with the previous year values for the chemistry department with a very slight upward trend.

The success value of 76.2% was higher than the division value at 66.6% and in line with the overall college value of 70.1%. The retention values for the chemistry department held steady from 86.6% in 2011-2012 to 86.9% in 2012-2013. The retention value of 86.9% is in line with the retention value for the division at 81.1% and the overall college retention rate of 83.9%.

Overall our retention rates for our all demographics either increased or remained stable. Across all of the demographics there was a marked increase in the success indicators.

For the demographic identifying as black where the success in 2012-2013 for the chemistry department was 81.3%. This value is slightly lower than 88.2% in 2011-2012 but still significantly higher than the level 54.6% in 2010-2011 academic year.

The success rate was significantly higher than the division success rate at 59.3% and the college success rate of 51.1%. The retention rate in the chemistry department for the black demographic dropped from 100% for the 2011-2012 academic year to 87.5% 2011-2012.

No individuals identifying as Native American enrolled in the Chemistry course in the year 2011-2012.

The retention rate of the demographic identifying as Hispanic remained stable with a retention rate of 76.0% for 2012-2013 which is in line with the division retention rate of 76.4% and the overall college retention rate of 81%. For the demographic identifying as Hispanic the percent success in 2011-2012 for the chemistry department was 59.2%. fro 2012-2013. This value appears to be a slight drop from the value 64.3% in 2011-2012 for the chemistry department. The success rate was in line with the division success rate at 57.4% and the college success rate of 64.1%.

The retention rate of the demographic identifying as Pacific Islanders s a fall giving a rate of 71.4% in 2012-13 with a retention rate of 90.9% for 2011-2012, however the retention rate for 2012-2013 was in line with the division retention rate of 74.9% and the overall college retention rate of 82.7%. For the demographic identifying as Pacific Islander the percent success in 2012-2013 for the chemistry department was 59.2% . This value appears to be on stable from a value of 64.3% in 2011-2012 for the chemistry department. The success rate was higher than the division success rate at 49.2% and close to the college success rate of 62.5%.

2. Discuss any differences in student success indicators across modes of delivery (on-campus versus distance education). Refer to **Delivery Mode Course Comparison**.

CSM Chemistry programs are offered mostly in on-campus mode with some CHEM231 and CHEM232 being offered as web-assisted courses occasionally starting in Fall 2012. We anticipate having enough annual data for CHEM231/CHEM232 to perform meaningful descriptive statistics by 2016. In addition, most chemistry courses – CHEM 192, 210, 220, 250, 410 and 420 have begun to use some web-assisted technologies.

In CHEM231 and CHEM232 were offered in a hybrid format in Fall 2012, Spring 2013 and Fall 2013. Pass rate for CHEM231 Fall 2012 and 2013 was 85.7% and 85.1% respectively. This compares with a pass rate of 80.6% in Fall 2011 which was the most recent semester when CHEM231 was offered as a fully-on campus class. Both the on-campus and hybrid classes were taught by the same instructor.

Currently we are not able to track drop-out rate, but based on memory, the hybrid classes also had higher completion rates than the f2f class. Students reported they found the hybrid classes to be more flexible and helpful in their scheduling and gave very positive feedback on the organizational aspects of the class.

C. Program Efficiency Indicators. Do we deliver programs efficiently given our resources?

Summarize trends in program efficiency as indicated in the **Student Success and Core Program Indicators** (LOAD, Full-time and Part-time FTEF, etc.)

A three-year average LOAD using an average of Fall, Spring, and Summer sessions has soared in recent years and is now at 635.5 (WSCH/FTEF) with the latest year available (2013) showing a net increase of 5% from this composite average value, as shown in the below chart. This observed growth is NOT sustainable given current resources.

Using the semesters available for the Full-time FTEF, there is a large spike in Spring 2013 (5.2 units) well above the prior years' data, which were 4.3 for both prior Spring semesters. This represents a jump of nearly 20%. This large increase in Full-time FTEF is a result of the loss of a Full-time Professor and demonstrates a great need for a replacement. Lastly it should be noted, nearly all CSM Chemistry professors are operating with an overload schedule and one Professor will be received significant release time in the coming year(s).

Adjunct FTEF has remained steady around its three-year averages.

Overall, these measures of program efficiency suggests that the CSM Chemistry department has seen a greater demand, as demonstrated using LOAD and FTEF, and requires as a department the necessary resources to maintain a high level of excellency for CSM students.

3. Additional Factors

Discuss additional factors as applicable that impact the program, including changes in student populations, state-wide initiatives, transfer requirements, advisory committee recommendations, legal mandates, workforce development and employment opportunities, community needs. See **Institutional Research** as needed.

We plan to introduce supplemental instruction (SI) to some of our chemistry courses, resources permitting. This program has been empirically proven by the department of education to yield higher grades for participates for the past forty years. More recently, SI has been piloted at CSM and shown to provide these same benefits to our college's students. We hope to replicate these same stories in our students.

In recognition of the changing demographics of CSM students, we are planning on introducing key concepts, such as reading apprenticeship (RA), in support of the basic skills initiative (BSI) into some of our chemistry classes. This integration hopefully will provide CSM chemistry students with the tools necessary to be successful and increase retention.

4. Planning

A. Results of Program Plans and Actions

Describe results, including measurable outcomes, from plans and actions in recent program reviews.

Plans to improve the health and safety of the stock room and the laboratories are currently in progress. An environmental assessment is being carried out and we are waiting on the recommendations of the report. Currently, the funds that have been secured do not cover the cost of installation of vented cabinets and fume hoods in the general chemistry laboratories. We have purchased 34 chrome books and they are currently being used during laboratory and lecture time. The chrome books allow students to access on-line resources such as homework and videos as well as run and collect experimental data.

The MeasureNet equipment has been semi-upgraded and plans to have the faculty trained in the use of the newer system are in progress. Notably, the wiring for the laboratories that contain these instruments have been fully refurbished and upgraded. The refurbishment and upgrading of the computers will take place this coming year.

Catherine is continuing to use tools learned from district-wide Reading Apprenticeship program in her classes. Yin Mei completed a Reading Apprenticeship workshop by distance ed. Kate is collaborating with Supplemental Instruction Coordinators to introduce SI to our chemistry classes. Yin Mei has begun to introduce elements from the "flipped-classroom" approach to a 410 and 210 classes. No data is yet available as this is the first semester, but student feedback is highly encouraging.

B. Program Vision

What is the program's *vision* for sustaining and improving student learning and success over the next three years? Make connections to the **College Mission and Diversity Statements**, **Institutional Priorities, 2008-2013**, and other **Institutional Program Planning** as appropriate. Address discussion in the Student Learning and Program Data section: SLO assessment results and trends in student success indicators.
[**Note**: Specific plans to be implemented in the next year should be entered in C of the Planning section.
CTE programs must address changes in the context of completion and employment rates, anticipated labor demand, and any overlap with similar programs in the area as noted in D1 and D2 of the Career Technical Education section.]

As a department, we are actively engaged in division, college and district-wide efforts to sustain and improve student success and excellence in direct compliance with and support of college mission statements. Our level of involvement range from participant to leadership roles in various activities: volunteer hours in the ISC, participation and presentation in the RA program, attending workshops on student success (IP2: promote academic excellence), enrollment and teaching in the STOT programs, and hosting a district wide chemistry department dialog to discuss ways to better serve chemistry students across the district (IP6: institution dialog, IP5: promote integrated planning), working with publishers and outside vendors to evaluate and test drive online homework software to assist student learning (IP2:promote academic excellence and IP5:efficient use of resources).

Chemistry department faculty have been key members of the division technology committee. As such, they have taken the lead with other science faculty on professional development of science faculty and other faculty across the college. For example, the technology committee has offered more than one workshop on the use of WA as flex activity. Workshops were well attended and we will continue with identify faculty technology needs and provide leadership and assistance as necessary. (IP6 – institution dialog; IP5: promoting integrated planning).

In addition to these online efforts, we have also planned and been engaged in four major initiatives: Our courses are successful both in terms of student enrollment and academic performance in exams; SLO results clearly shows the effectiveness of our teaching. But the ongoing vision for the chemistry department is to continually increase student access and maintain academic excellence. So we are constantly seeking new methods and improved pedagogy which better serve changing trends in student learning culture and faculty personnel changes. So we are active in evaluating and implementing new ideas all with the view of enhancing program excellence and student success. (IP2 and IP5)

In the current, year, a prime example on this vision is a team effort to review and enhance existing laboratory curriculum for several chemistry courses. Our work includes development of new on-line support material such as videos to support student preparation for lab classes; student preparedness for class is a strong indicator for student success. (IP2). We also make these resources available to all faculty in the department to foster and support intra-department team work, which is also a more efficient use of resources including instructors' effort and time (IP4).

We are also making improvements to the Laboratory Management System (LIMS) – which is used in multiple chemistry laboratory classes - to a more streamlined experience for the student and instructor making the laboratory experience more relevant to today's working environment. In this we recognize that part of continue academic excellent is ensure the knowledge and skill sets we teach our students remain both relevant, current and cutting edge so they are prepared for success in transfer and beyond (IP2 and IP5)

Thirdly, starting Spring 2015, we will offer an online chemistry class, CHEM100 Survey of Chemistry with an expanded enrollment cap of 100 students. This class would be suitable for two primary audiences: non-science majors and concurrent enrollment students. CHEM680MA (experimental course for CHEM100) is one of two pilot courses our division is working on with district funding and college support. Through it, we are promoting relevant, high quality programs and services (IP3).

Lastly, we'd are exploring ways to introduce Supplemental instruction in some of our programs (exact course to be determined Fall 2014), based on strong evidence that the inclusion of SI instructors significantly improves student success in our courses. This initiative clearly demonstrates our commitment to develop responsive, high-quality programs (IP3) that promote academic excellence (IP2) and improve student success (IP1)

The first two initiatives (laboratory curriculum enhancement; LIMS upgrade) are being undertaken with minimal or no additional funding and instructor remuneration; the CHEM100 project is one that is funded by district support; whether we are able to introduce SI to any of our courses depends entirely on it is funded or not.

If we are to continue to not only teaching effectively, but to develop our programs in line with College vision and institutional planning, we need additional resources and support from college administration – funding for release time and resources as well as technical support.

1. To guide future faculty and staff development initiatives, describe the professional activities that would be most effective in carrying out the program's vision to improve student learning and success.

As a department, we are actively engaged in division, college and district-wide efforts to sustain and improve student learning and success. Our level of involvement range from participant to leadership roles in various activities: identify potential learning center tutors, volunteer hours in the ISC, participation and presentation in the RA program, attending workshops on student success, enrollment and teaching in the STOT programs, hosting a district wide chemistry department dialog to discuss ways to better serve chemistry students across the district, working with publishers and outside vendors to evaluate and test-drive online homework software to assist student learning.

Two major initiatives include: plan to introduce Supplemental Instruction in some of our programs (exact course to be determined Fall 2014), this is based from strong evidence that the inclusion of SI instructors significantly improves student success in our courses. Starting Spring 2015, we will offer an online chemistry class (CHEM100 Survey of Chemistry) but initially offered as an experiment course CHEM680 MA. As an online class with expanded enrollment cap of 100 students, this class would suitable for two primary audiences: non-science majors and concurrent enrollment students.

Release time is required for faculty to be able to overhaul the current lab manuals for Chem 192, Chem 210, Chem 220 and Chem 250.

2. To guide future collaboration across student services, learning support centers, and instructional programs, describe the interactions that would help the program to improve student success.

As a department, we are actively engaged in division, college and district-wide efforts to sustain and improve student learning and success. Our level of involvement range from participant to leadership roles in various activities: identify potential learning center tutors, volunteer hours in the ISC, participation and presentation in the RA program, attending workshops on student success, enrollment and teaching in the STOT programs, hosting a district wide chemistry department dialog to discuss ways to better serve chemistry students across the district, working with publishers and outside vendors to evaluate and test-drive online homework software to assist student learning.

3. To guide the **Institutional Planning Budget Committee** (IPBC) in long-range planning, identify any major changes in resource needs anticipated during the next three years. Examples: faculty retirements, equipment obsolescence, space allocation.

See the Resource Requests section below to enter itemized resource requests for next year.
Leave sections blank if no major changes are anticipated.

Faculty

We are requesting 2 full time chemistry faculty positions. We have increased the number of classes being offered. At the present time full time faculty must do overloads to cover all of the classes. It is very difficult to find qualified chemistry adjunct professors. At the present time there are 6 adjunct professors and only 4 full time professors. The full time faculty no longer wants to do an overload. If we cannot hire full time faculty we will need to hire at least three more adjunct professors IF we can find them which does not look very likely. The full time faculty still need to mentor the adjuncts which takes time. With Yin Mei Lawrence having 50% release time next school year we will need to continue to do overloads and find two more adjunct professors or cancel classes.

Equipment and Technology

The pH electrodes are reaching their lifespan and need to be replaced. We will need to purchase a minimum of 60 pH electrodes.

c) We may need to replace the measurenet data acquisition system with another type of data acquisition system. This will require at least 40 stations and 40 each of the corresponding probes that go with the new system.

d) We need to buy glassware to replace the glassware the students brake during each semester. We need to buy at least 500 each of the following: 50 mL beakers, 100 mL beakers, 150 mL beakers, 250 mL beakers. We need to buy at least 100 each of the following: 10 mL graduated cylinders, 100 mL graduated cylinders, 400 mL beakers, 1 L beakers, 50 mL burets, 100 mL volumetric flasks, 250 mL volumetric flasks.

e) We need to buy at least three more centrifuges.

f) We need to buy at least four more milligram balances.

g) We need to replace the DI water filters.

h) We need to replace the printers in each lab room.

i) There is a need for more fume hood space in the general chemistry laboratories. Historically the decision was made to only have one fume hood in the laboratory which leads to logistical and safety issues when experiments are running in the classroom. Given that one of the major advantages our students have is the hands on laboratory experience that they gain, it is essential for their safety and their training that they are able to carry out the experiments in a safe environment.

j) We need to buy at least 60 buret clamps.

k) We need to buy at least 20 silicone rubber hand protectors.

l) We need to buy at least 4 more UV/VIS spectrophotometers.

m) We need to buy s, p, d and f orbital model sets to replace the ones that are over 50 years old and are falling apart.

n) We need to buy 40 weighing bottles.

o) We need to buy 20 desiccant cartridges

p) The last time we purchased organic glassware was in 2005 when we moved into the new building. We have also increased the sections of organic chemistry significantly. Therefore, more glassware is needed: 20 more microkits.

q) The GC/MS instrument can no longer be used in a teaching capacity, as they require preventative maintenance. They are used purely for instructional show.

r) MeasureNet stations have been failing and require replacement.

s) Computers used in the various labs, along with printers are in need of replacement.

t) Hoods require inspection and necessary repairs.

Instructional Materials

We need to buy s, p, d and f orbital model sets to replace the ones that are over 50 years old and are falling apart.

The last time we purchased organic glassware was in 2005 when we moved into the new building. We have also increased the sections of organic chemistry significantly. Therefore, more glassware is needed: 20 more microkits.

Classified Staff

We would like to hire a part time person to help with the increased demands of the preparations for the chemistry labs.

Facilities

The volatile organic compounds are currently being stored in cabinets that are not vented. To maintain a safe working environment it is necessary that these chemicals are stored in a suitable cabinet that has appropriate venting. Two new cabinets are needed in the stock room and retrofitting of the vents in existing cabinets is required.

In the general chemistry laboratories there are only single fume hoods in each laboratory. This leads to significant logistical and safety issues during teaching sessions. To effectively prepare our students for the work place and their next academic institution they must receive rigorous laboratory training. Currently the fume hoods in the laboratories cannot adequately provide the right balance between efficiency and safety. The laboratory sessions require complicated logistical planning by the teacher. For example, a typical class has 30 students. Each fume hood can safely accommodate a maximum of 2 students at a time. If each student spends 3 minutes dispensing chemicals at the fume hood that amounts to 90 minutes spent only getting their chemicals. This can be further complicated if the students are working with chemicals that cannot be dispensed at the same time. It can take up to 45 minutes just to get the class equipped and ready to do their experiment. This is not efficient use of time or beneficial for their learning. It also poses real safety risks when working in the lab.

C. Program Plans and Actions to Improve Student Success

Prioritize the plans to be carried out next year to sustain and improve student success. Briefly describe each plan and how it supports the **Institutional Priorities, 2008-2013**. For each plan, list actions and measurable outcomes. (Plans may extend beyond a single year.)

As a department, we are actively engaged in division, college and district-wide efforts to sustain and improve student learning and success. Our level of involvement range from participant to leadership roles in various activities: identify potential learning center tutors, volunteer hours in the ISC, participation and presentation in the RA program, attending workshops on student success, enrollment and teaching in the STOT programs, hosting a district wide chemistry department dialog to discuss ways to better serve chemistry students across the district, working with publishers and outside vendors to evaluate and test-drive online homework software to assist student learning.

Two major initiatives include: plan to introduce Supplemental Instruction in some of our programs (exact course to be determined Fall 2014), this is based from strong evidence that the inclusion of SI instructors significantly improves student success in our courses. Starting Spring 2015, we will offer an online chemistry class (CHEM100 Survey of Chemistry) but initially offered as an experiment course CHEM680 MA. As an online class with expanded enrollment cap of 100 students, this class would suitable for two primary audiences: non-science majors and concurrent enrollment students

Chem 250 will be increased from a 4 unit class to a 5 unit class in fall 2014. Additional material must be covered to match the ACS guidelines. Also, SJSU class equivalent to chem 250 is also 5 units. It will now be much easier for students transferring to SJSU.

5. Resource Requests

Itemized Resource Requests

List the resources needed for ongoing program operation.

Faculty

NOTE: To make a faculty position request, complete **Full-time Faculty Position Request Form, AY 2013-2014** and email to your Dean. This request is separate from the program review.

Full-time faculty requests	Number of positions
Chemistry professors	2

Equipment and Technology

Description	Cost

MeasureNet - replacement	6,000
MeasureNet Probes - various	3,500
Lab Computers	40,000

Instructional Material

Description	Cost
50 mL beaker x 500	$2200
100 mL beaker x 500	$2200
150 mL beaker x 500	$2200
250 mL beaker x 500	$2200
400 mL beaker x 100	$500
1 L beaker x 100	1200
50 mL burets x 100	$9500
10 mL graduated cylinders x 100	$600
100 mL graduated cylinders x 100	$950
100 mL volumetric flasks x 100	$2700
250 mL volumetric flasks x 100	$3400
weighing bottles x 40	$400
pH electrodes x 30	$4500
buret clamps x 60	$1800
silicone rubber hand protectors x 20	$450
dessicant cartridges x 20	$180
DI water filters x 12	$6000
centrifuges x 3	$1500
milligram balances x 4	$11,000
UV/VIS spectrophotometers	$14000
printers x 4	$5000
Dat acquisition stations and probes	$?
orbital model sets	$1800
water electrolysis demo cell	$250

Ga law demo kit	$350
Large scale models: NaCl, H2O, graphite, diamond	$750
Microscale glassware kit for organic chemistry x 20	$6000
Replacement ACS exams	$600
Replacement calculators	$120
Laboratory books - reference	$3500

Classified Staff

Description	Cost
Part-time stock room person	$35,000

Facilities

For immediate or routine facilities requests, submit a CSM Facility Project Request Form.

Description	Cost
2 x fumehoods and vented cabinets for general chemistry labs & stockroom	500,000

6. Program Maintenance

A. Course Outline Updates

Review the **course outline update record**. List the courses that will be updated in the next academic year. For each course that will be updated, provide a faculty contact and the planned submission month. See the **Committee on Instruction website** for **course submission instructions**. Contact your division's **COI representatives** if you have questions about submission deadlines.
Career and Technical Education courses must be updated every two years.

Courses to be updated	Faculty contact	Submission month
Chem 220	Kate Deline	Fall 2014
Chem 231	Yin Mei Lawrence	Spring 2015
Chem 232	Yin Mei Lawrence	Spring 2015

B. Website Review

Review the program's website(s) annually and update as needed.

Faculty contact(s)	Date of next review/update
Jeff Flowers	December 2014

C. SLO Assessment Contacts

Faculty contact(s)	Date of next review/update
Chem 210 Kate Deline	Fall 2014
Chem 220 Kate Deline	Spring 2013
Chem 250 Kate Deline	Fall 2014
Chem 192 Catherine Ciesla	Fall 2014
Chem 231 Yin Mei Lawrence	Fall 2014
Chem 232 Yin Mei Lawrence	Spring 2016
Chem 410 Jeff Flowers	Fall 2014
Chem 420 Jeff Flowers	Spring 2014