2018 Chemistry Annual Program Plan

CHEM Chemistry

I.A. Program Profile: Purpose

Describe the program(s) to be reviewed. What is the purpose of the program and how does it contribute to the mission of Skyline College?

Narrative

The chemistry program serves students from San Mateo County and surrounding areas by providing lower division transfer programs, which prepare students for continued education in four-year colleges and universities. Most of our students who complete the general and organic chemistry sequences transfer to four-year colleges.

Some of the Department's goals include:

- Provide a high quality and complete lower division chemistry program.
- Enable students to gain experience with laboratory equipment and learn procedures and skills to prepare them for upper division studies in the sciences.
- Enable students to succeed in subsequent classes at Skyline College, transfer institutions, and in employment.
- Provide science majors with a solid foundation in the fundamentals of general and organic chemistry.
- Enable students in the health professions to gain the knowledge and skills in chemistry to succeed in their educational programs.
- Provide general education and transition classes for students with non-science backgrounds or goals.
- Provide students with the knowledge and critical thinking skills needed to evaluate scientific information they encounter in research and in everyday life.

The department offers:

- Chemistry in Action (CHEM 112) that meets a general education science with laboratory course requirement for non-science majors.
- Elementary Chemistry (CHEM 192) to help prepare students for success in the General Chemistry major's sequence.
- Chemistry for Health Professionals (CHEM 410) to prepare for health professions programs such as Respiratory Therapy and Nursing.
- Chemistry majors-level General Chemistry (CHEM 210-220) and Organic Chemistry (CHEM 234/237-235/238) sequence for students who are majoring in Chemistry, Biology, Physics, some Engineering majors, and those who are preparing for professional schools.

- Survey of Chemistry and Physics (CHEM114) to support the Associate Degree for Transfer in Elementary Teacher Education.

The department contributes to the College mission and goals by preparing students for academic transfer, acceptance to professional programs, entering the workforce, and by supporting an academic and scientific culture in our College. The department works closely with the MESA program and the Learning Center to develop study groups and problem solving sessions to support students across the chemistry curriculum. The relationship with the MESA program and the Learning Center adds much to student learning in Chemistry and has helped us attract and retain underrepresented students, as well as those who may be struggling because of work and family obligations.

The chemistry faculty are contributing to college wide efforts to improve student learning support. The introduction and continued implementation of the Skyline Promise has great promise to have a direct impact on student success. The Chemistry Department is fully committed to work with this program and we are excited to see how we might improve our student's success in achieving their future goals in a timely manner. We're also committed to the expansion of programs that will lead to better integration of student support services and instructional services, which is a direct path to student success (for example, development of integrated review workshops through the Learning Center). The SMT division is currently planning to create a STEM Center, which will greatly benefit the students in our chemistry courses.

I.B. Program Planning Team

Annual program planning is intended to be a collaborative process which promotes dialogue and reflection. Please identify all individuals who contributed to or shaped the narrative. Include names and the title or role of each person.

Narrative

Joaquín J. Rivera, Professor

Alec J. Bates, Professor

Safiyyah Forbes, Associate Professor

II.A. Analysis: Progress on Prior Program Objectives (Goals) and Activities

Describe the progress made on previously established program objectives (goals) including identification of achievements or areas in which further effort is needed. New programs which have not yet established CPR/APP objectives should discuss progress on program implementation or activities.

Narrative

Previous Recommendation: The FTE/PTE ratio is under 50% for the chemistry department. We need an additional full-time faculty member. The hiring of a new full-time faculty member would be of great help to continuing to build and develop the coursework and expand department resources and improve student learning. In addition, having an additional full-time faculty member would help with the continuity of instruction within the chemistry program

Response: We still need an additional position.

Previous Recommendations: Need for an increase in the Chemistry supply budget

Response: We still need an increase in the supply budget.
Previous Recommendation: The department is changing the scheduling pattern in CHEM 210 for Fall 2017 to allow for discussion/recitation sessions in order to improve student success in the course, and to offset the impact of the removal of CHEM 192 as a prerequisite for the course. This will allow for more structured problem-solving time in class. Embedded tutors during the sessions will assist the instructor in addressing student needs as related to critical thinking and problem solving strategies during these sessions.
Response: The recitation sessions have been implemented in CHEM 210. We need to analyze the data to determine if they have had a positive impact in improving student success.

II.B. Analysis: Program Environment

Describe any recent external or internal changes impacting the program or which are expected to impact the program in the next year. Please include when the specified changes occurred or are expected to occur.

Narrative

The department just changed the scheduling pattern in CHEM 210 in the Fall 2017 to allow for discussion/recitation sessions in order to improve student success in the course, This allows for more structured problem-solving time in class. Embedded tutors during the sessions assist the instructor in addressing student needs as related to critical thinking and problem solving strategies during these sessions. We need to analyze the data to determine if they have had a positive impact in improving student success.

II.C. Analysis: Student Learning Outcomes (SLOs and PSLOs)

(1) Instructional Programs Only: Describe what was learned from the assessment of course SLOs for the current and past year.
(2) Student Service Programs Only: If PSLOs are being assessed this year (3-year cycle), describe what was learned. If no assessment was done because this is an off-cycle year, please state that this item is not applicable.

Narrative

Students have been successful in the program-level student learning outcomes in chemistry. Students have demonstrated high proficiency in Critical Thinking, Communication, and Experimentation – all central to the mission of chemical instruction. A number of initiatives have been instituted to improve student success in these areas and in the course and program more generally.

To improve communication skills, an in-house laboratory manual for CHEM 192 – Introductory Chemistry was developed to introduce formal lab report writing at the first course in the majors sequence. Faculty also worked with the Learning Center to develop workshops to introduce concepts related to lab report writing.

In CHEM 410 – Chemistry for Allied Health, students are required to identify functional groups in biologically important compounds. Students have demonstrated success in this outcome; however, additional work in identification of functional groups using computer modeling or physical molecular models to assist in the recognition and understanding of the chemical structures will further improve student performance on this outcome.

Student success in CHEM 210 - General Chemistry 1 has been an ongoing concern for the Chemistry department and was addressed by reintroducing a CHEM 192 prerequisite. However, this prerequisite has been removed to align with our sister colleges. To offset this change, the department is instituting recitation/discussion sessions as part of the scheduling pattern to bolster student success in problem-solving and critical thinking.

III.A. Reflection: Considering Key Findings

Consider the previous analysis of progress achieved, program environment, and course-level SLOs or PSLOs (if applicable). What are the key findings and/or conclusions drawn? Discuss how what was learned can be used to improve the program's effectiveness.

Narrative

The chemistry program provides a comprehensive lower-division Chemistry program that meets the needs of students for transfer to science major programs, preparation for professional schools, entrance into health profession programs, and general education requirements.

We have seen an increase in success and retention for all groups over the last five years.

Although success and retention rates have increased among all ethnic groups, success for African American, Hispanic/Latino and Pacific Islanders are lower than the departmental average. This shows that additional resources for student support and tutoring outside of the classroom are needed to improve student success in Chemistry courses. This might include hiring tutors, embedded tutors, offering learning skills supplement courses, supplemental instruction sessions, continue the partnership with the Math, Engineering and Science Achievement (MESA) program, partnering with existing campus learning communities and student support programs such as the Learning Center and re-instituting the CHEM 192 prerequisite for CHEM 210. In the CHEM 210 course we have implemented a recitation session to increase student success.

Our program is very efficient. Our load has increased over the last three years. The faculty and staff of the Chemistry Program are all exceptionally knowledgeable in their area of expertise and share a strong commitment to student success. Faculty members maintain a current and meaningful curriculum in Chemistry. These members have built an excellent and efficient team/family that delivers the highest quality of educational services to our students.

Increases in the number of laboratories and increases in the cost of chemicals and equipment over the last few years should also be met with an increase of a budget to both purchase materials and chemicals. A long-term plan for maintaining, purchasing and replacing laboratory equipment is essential to staying current and being able to teach with modern technology.

A new full-time faculty member is needed. The FTE/PTE ratio is under 50% for the chemistry department. The hiring of a new full-time faculty member would be of great help to continuing to build and develop the coursework and expand department resources and improve student learning. In addition, having an

additional full-time faculty member would help with the continuity of instruction within the chemistry program.

III.B. Reflection: ISLOs

If your program participated in assessment of ISLOs this year:
(1) What are the findings and/or conclusions drawn?
(2) Does the program intend to make any changes or investigate further based on the findings? If so, briefly describe what the program intends to do.

Narrative

Students in all chemistry courses improve their critical thinking skills by analyzing complex chemistry problems in both lecture and laboratory settings. In the laboratory in particular, students are required to develop experimental plans and molecular-level models to relay chemical information. Students improve their communication skills by answering questions in both sentence and chemical symbol formats. Students practice scientific communication by keeping a laboratory notebook and writing lab reports.

All courses in the chemistry program help students improve scientific understanding and effective communication. The lab component of chemistry courses is essential for the outcome of drawing conclusions based on the scientific method, computations or experimental and observational evidence. All courses have students construct and analyze statements in a formal symbolic system (chemical symbols). Lab reports help student practice deriving conclusions based on their data and communicating those results through scientific language.

Students are also able to demonstrate skills central to computer literacy. Many of the laboratory experiments in General Chemistry require students to measure data using a variety of equipment and to manipulate and graph data using excel. Most homework is completed through an online homework system, Sapling Learning.

Working in the lab requires students to interact with each other, work in groups, show leadership skills and demonstrate critical thinking. All of these apply to the citizenship ISLO.

IV.A. Strategy for Program Enhancement: Continuation/Modification

Indicate whether the program is continuing implementation of the last CPR strategy or revising the strategy. Please describe the modifications if revisions are intended.

Note: Any new strategies should be linked to Institutional Goals through creation of objectives in the next section. If the program has not yet participated in comprehensive program review, an annual or multi-year strategy can be defined in this item.

Narrative

The program is continuing implementation of the last CPR strategies.

The department is proposing to start a Chemistry Jam Program in 2018-19. Chemistry Jam will be a free one-week intensive, fun and stimulating program that will remedy some of the challenges our students face with chemistry. This program will aid in providing the foundational knowledge for incoming and existing students to successfully complete their first semester chemistry course thus allowing them to either continue with the chemistry course sequence or fulfill their chemistry requirements on time.

IV.B. Strategy for Program Enhancement: Action Plan and Resource Requests

Based on the most recent CPR and any desired modifications, develop an annual action plan with related resource requests. No narrative response will be entered in this section, but the objectives you create will be printed automatically in the APP report under this item.

(1) To begin, click on PLANNING at the top of the page, then CREATE A NEW OBJECTIVE. To view previously created objectives, click PLANNING at the top of the page, then VIEW MY OBJECTIVE.
(2) IMPORTANT! Make sure to associate each objective to this standard in the APP. Need help? Contact the PRIE Office for further instructions. Institutional Goals.

Narrative

Associated Objectives
472-Hire a new full-time faculty 473-Hire an instructional aid 478-Implement a Chemistry Jam Program in 2018-19 474-Increase the chemistry supply budget and but additional equipment.
Budget and Objectives of Chemistry Department

Objectives of Chemistry Department

Planning Year: 2018-2019

Planning Year: 2018-2019

Unit Code	Planning Unit	Unit Manager
2414CHEM00	**Chemistry**	**Rivera-Contreras, Joaquin**

Objective Status: New/In Progress

472	Hire a new full-time faculty The FTE/PTE ratio is under 50% for the chemistry department.
473	Hire an instructional aid There is lack of student help in the stockroom. Programmatic changes have increased demand on the stockroom and more services must be provided.
474	Increase the chemistry supply budget and but additional equipment. For our students to remain competitive for transfer and in the current job market, it is essential for them to be exposed to a broad range of experimental methods and experience of handling hazardous materials. These experiments require the use of expensive glassware and chemicals. Buy more organic chemistry micro kits (20 x $480 per kit = $9,600). Buy additional hot plates/stirrers (20 x $400 per hot plate = $8,000). Buy additional Mel-temps (10 x $1,000 per Mel-temp = $10,000). Buy more top loading balances (3 x $ 1,000 per balance = $3,000).
478	Implement a Chemistry Jam Program in 2018-19 Chemistry Jam will be a free one-week intensive, fun and stimulating program that will remedy some of the challenges our students face with chemistry. This program will aid in providing the foundational knowledge for incoming and existing students to successfully complete their first semester chemistry course thus allowing them to either continue with the chemistry course sequence or fulfill their chemistry requirements on time.