

# SKYLINE COLLEGE

## ANNUAL PROGRAM PLANNING SELF-STUDY

Program Title: Chemistry

Date Submitted: April 15, 2014

### Key Findings:

Need for two full-time faculty

Need for instrumentation: Nuclear magnetic resonance instrument.

Enrollment and success over the past two years has remain constant. We have had an increase in enrollment without decreasing success and retention.

Students in General Chemistry I (transferable course) are not completing successfully the course. Our withdrawal rate has increased with the expansion of lecture sections. Currently we are working on several strategies (mention in the report) to resolve this important issue for the Chemistry Department.

### 1. Planning Group Participants (include PT& FT faculty, staff, students, stakeholders)

List of names and positions:

Carmen L. Velez - Assistant Professor Chemistry

Mousa Ghanma - Laboratory Technincian and Chemistry Instructor

AJ Bates - Chemistry Professor

Janice McOmber - Adjunct Chemistry Professor

Ray Hernandez - Dean SMT

Maria Somma - Adjunct Chemistry Professor

Brian Young - Adjunct Chemistry Professor

### 2. Contact Person (include e-mail and telephone):

Carmen L. Velez [velezcarmen@smccd.edu](mailto:velezcarmen@smccd.edu) and AJ Bates, [batesa@smccd.edu](mailto:batesa@smccd.edu)

650-738-4383

### 3. Program Information

#### A. Program Personnel

Identify the number of personnel (administrators, faculty, classified, volunteers, and student

workers) in the program: 0 Administrators, 3 FT Faculty, 7 Adjunct Faculty, 1 Classified Lab Technician, 1 Classified Temporary, 0 Volunteers, 2 Student Workers

F T Faculty: 3

PT/O L F aculty (F T E): 3.5

F T Classified: 1

PT Classified (F T E): 2

Volunteers: 0

Student Workers: 2

#### B. Program mission and goals

State the goals/focus of the program and how the program contributes to the mission and priorities of the College and District. Address how the program meets the current year's strategic priorities. (200 word limit is recommended.)

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.

#### 4. Program/Service Area Student Learning Outcomes and Program Data

A. Summarize recent course (for instruction, including student service courses) or program (for student services and every three years, C T E programs) S L O assessment, identify trends and discuss areas in need of improvement. Please attach summary T racdat reports with assessment and analysis for S L O s evaluated during the last two years (prior to submission deadline of April 1<sup>st</sup>). (200 word limit is recommended.) Tool: <https://sanmateo.tracdat.com/tracdat/>

Below is a summary of the trends and areas in need for the courses offered by the Chemistry Department:

##### 1. CHEM 112:

Results:

The students were able to successfully to describe this cell. The average was 9.7 out of 10 and the STDEV was 0.7

Students were less successful writing the oxidation and reduction half-cell reactions, and balancing the overall reaction.

Action & Follow-up:

1. Introducing some worksheets that help better understand the equation concept, the oxidation and reduction concepts, and provides training on balancing chemical equations.

2. Assign homework problems that would reassure the goals of the worksheets, but here the problems assigned would relate to real world experience such as disinfectants, antioxidants, electrolysis, and corrosion.

2. CHEM 192 – Moving forward: The decision has finally been made to replace the existing, out of date, expensive lab manual. Carmen has put a repository site onto Web Access for placing worksheets and replacement lab material. The preliminary replacement will start being used Spring 2013. We discussed that Chemistry 210 lab sessions are being filled with additional worksheets, lab lectures and instructions. We are doing the same for Chemistry 192. More worksheets are being introduced and used in Chemistry 192 fall 2012 and the lab sessions are being filled with additional worksheets to supplement the (very short) labs from the existing lab book. Students are spending much closer to three hours per lab session. Additional worksheets are reinforcing the skills required for success at stoichiometry (we start with simple word problems, then move to 3 step word problems, introduce conversions from grams to moles, balanced chemical equations, then on to stoichiometry).

3. CHEM 210 - Most of the chemistry 210 instructors are concerned with the students entering the Chemistry 210 classes. The highly advised prior chemistry exposure is not taken seriously and too many students are taking this class without prior chemistry or with very poor math skills. Most districts around us (Chabot, San Francisco City College, Foothill College, San Francisco State University) require chemistry placement tests to get into general chemistry. As a result, they have a higher success rate (% passing vs. percent starting). As we are not yet able to change the highly advised prior chemistry, we can make use of the email capability for students registered in the class and send out introduction memos, reviewing reality (as in students with minimal math and prior science skills have greater than 50% drop/fail rate in this class. As we want you to succeed, we advise that you take Chem 192 first, if you have never had chemistry, and that you pass at least Precalculus before trying Chem 210. We clearly go over this information at the beginning of the semester to urge unprepared students to take Chemistry 192. We are working to get more statistics to support this information. Actions being taken: Additional request to the Research Department for more data on chemistry 210 success. Lab sessions are being better utilized for lectures, worksheets, and study sessions. The lab manual contains a large number of worksheets, which are being assigned during the lab sessions (done while students wait for experiments to happen). Short lectures and problem solving sessions are scheduled in. Students are working in lab for the whole three-hour allotment, in hopes that more work and review will allow more students to succeed in the class.

For the other courses in the chemistry department SLO's have been done. We are waiting for the Action and Follow-up report from these courses.

1. CHEM 220 - missing Action & Follow-up in TracDat report.
2. CHEM 234 - missing Action & Follow-up in TracDat report
3. CHEM 235 - missing Action & Follow-up in TracDat report
4. CHEM 237 – not added to TracDat
5. CHEM 238 - missing Action & Follow-up in TracDat report
6. CHEM 410 – missing Action & Follow-up in TracDat report.

B. Analyze evidence of Program performance. Review and analyze productivity, student characteristics and outcomes. (200 word limit is recommended.)

Tool: <http://www.skylinecollege.edu/prie/programdata.php>

Productivity:

The Chemistry department is efficient. For the year 2012/13 the load/productivity was 548. This number is slightly higher than the state productivity and efficiency measure of 525. The Chemistry load for 2012/13 is slightly lower than the campus wide load 2012/13 of 589.

Success and Retention:

The Retention and Success for the Chemistry Department has remained stable over time (2007/08 – 2012/13, 3% increase). We had observed an increased enrollment without having a decrease in success and retention.

C. Explain how other information may impact Program (examples are business and employment needs, new technology, new transfer requirements etc.)  
(200 word limit is recommended.)

Increasing student's training in chemistry or any other STEM field is very important for the future of STEM careers. For example, the White House Education Initiative "Educate and Innovate" is urging educators to increase STEM literacy so that all students can learn deeply and think critically in science, math, engineering, and technology, move American students from the middle of the pack to top in the next decade, and to expand STEM education and career opportunities for underrepresented groups, including women and girls.

The Bureau of Labor Statistics Employment of chemists is expected to increase by 4 percent from 2010 to 2020, slower than the average for all occupations. Chemists will continue to be needed in scientific research and development and to monitor the quality of chemical products and processes.

This year Nick Kapp and Melissa Michelitsch revamped the Biotechnology Program as Career Pathway. Our department will be offering one of the sections of CHEM 410 course with a Biotech focus.

#### 5. Curricular Offerings

A. Program Curriculum and Courses. If your program does not offer curriculum, please state "N/A". Tools: CurricUNET <http://www.curricunet.com/smcccd>;  
<https://sanmateo.tracdat.com/tracdat/>

The above course was added last year and haven't been taught. Not sure if we need to include this course.

1. COURSE ID: CHEM 114 TITLE: Survey of Chemistry and Physics  
Semester Units/Hours: 4.0 units; a minimum of 48.0 lecture hours/semester; a minimum of 48.0 lab hours/semester  
Method of Grading: Letter Grade Only  
Recommended Preparation:  
Eligibility for ENGL 836 and READ 836, or ENGL 846, or ESOL 400, or equivalent.  
MATH 110, or equivalent.

#### 2. COURSE DESIGNATION:

Degree Credit

Transfer credit: CSU

AA/AS Degree Requirements:

Skyline - GENERAL EDUCATION REQUIREMENTS: F1b. Group B-Laboratory Courses

#### 3. COURSE DESCRIPTIONS:

Catalog Description:

A conceptual survey of physical science (physics and chemistry) intended for non-science majors at the General Education level. A general discussion of the scientific method and techniques will be followed by physics, chemistry, and integrated topics. The laboratory portion will cover a hands-on exploration of phenomena discussed in lecture. The physics component of the course will discuss motion, force, energy, electricity and magnetism, waves and light. The chemistry component of the course will focus on chemicals and reactions common in everyday life. Concepts relating to the nature and interactions of atoms, ions, and molecules will be presented. Students will also learn to use and evaluate information presented on product labels, in advertisement, and available through the internet. Also listed as PHYS 114. Transfer credit: CSU.

#### 4. STUDENT LEARNING OUTCOME(S) (SLO'S):

Upon successful completion of this course, a student will meet the following outcomes:

- A. Interpret the meaning of the chemical equation and relate it to the physical materials involved in the process.
- B. Employ chemical experiments to test a hypothesis and critically analyze the results.

- C. Describe energy in forms important to systems in physics and chemistry.
- D. Describe the fundamental forces that hold an atom together, and its role in chemical bonding.
- E. Critically evaluate scientific information in the popular press.

This course is approved by the curriculum committee. I do not think it is part of our curriculum yet.

## B. Identify Patterns of Curriculum Offerings

In the Chemistry Department we offer three different educational tracks with three different cycles of courses:

- a. For General Education students: CHEM 112 (Survey of Chemistry topics offered in the Spring Semester only)
- b. Allied Health students: CHEM 410 (General, Organic and Biochemistry course)
- c. Majors students (typically transfer students) have the opportunity to take:  
 Year 0.5: CHEM 192 (Introductory Chemistry) - this year this course will be a prerequisite for CHEM210. Approved by curriculum committee.  
 Year 1: CHEM 210/220 General Chemistry (2 semesters)  
 Year 2: CHEM 234/235 Organic Chemistry and CHEM 237/238 Organic Chemistry Lab (2 semesters)

## 6. Response to Previous Annual Program Plan & Review

List any recommendations for the program and your responses to these recommendations based on previous Annual Program Plan and/or C T E Professional Accreditation report.

1. Identify additional resources for student support and tutoring outside of the classroom to improve student success in Chemistry courses. This might include hiring graduate student tutors, offering learning skills supplement courses, and partnering with existing campus learning communities and student support programs.
  - a. Carmen Velez is participating as Faculty Sponsor of the MESA Program for Spring 2013. In the future we will like to see graduate student tutors in the center to help students in all STEM disciplines. The MESA center tutoring schedule for chemistry is limited to CHEM 192, CHEM 210 and CHEM 410. A PIF grant was written in collaboration with MESA (Stephen Fredricks), Carmen Velez (Chemistry) and Counseling (Suzanne Poma) to transform the MESA center into a STEM center where all students will be able to use complete facility for tutoring and counseling.
  - b. Carmen Velez and AJ Bates are prepared to pilot an alternative schedule for General Chemistry 210 course in which a recitation component is included. We are waiting for administration approval and room allocation for the recitation session.
  - c. The Science in Action Lecture series is an ongoing program in collaboration with San Francisco State University Prof. Steve Weinstein and Carmen Velez. Every week we have postdoctoral fellows giving scientific lectures to our students. We hope to

increase the participation of our students in different STEM research fields besides medicine.

- d. Request for two full time faculty. FTE/PTE ratio is under 50% for the chemistry department.
- 2. Assessment plans need to be developed and implemented for program courses.
  - a. Janice McOmber took the lead for SLO development, implementation, analysis and Tracdat report.
  - b. All faculty are working on SLO modification for all chemistry courses. An new 3-year implementation plan is also part of the SLO modification.
- 3. A new full-time faculty member is needed.
  - a. On Fall 2011 new faculty was hired, Carmen Velez, PhD.

## 7. Action Plan

Provide your action plan based on the analysis and reflections provided in the previous sections.

Note: resource requests should be connected to action plans

Next steps for Action Plan:

Implement changes to the general chemistry CHEM 210 schedule by allocating time for a recitation. The main goal of Recitation is to increase student success in the course by improving their problem-solving skills and their corresponding exam performance. This will take place Fall 2014. Often, students say that after doing all of the assigned homework, getting good scores on quizzes, doing well on practice exams, and feeling that they “know and understand everything”, they still earn a low score on the exam. In the Recitation section, the instructor will guide students in developing process-oriented problem-solving skills, and provide them with instructions on how to do this, practice with the problems, and feedback on their progress.

In Fall 2014, the course CHEM 192 will be a prerequisite for CHEM 210. An increase of CHEM 192 section will be necessary to fulfill the need in the department.

All Chemistry faculty are working together to modify SLO and the SLO assessment 3-year plan in order to have more meaningful based on results.

## 8. Resource Identification

### A. Professional Development needs

- a. Ongoing support for conferences and other professional development.
- b. Allocate significant (>50 min) time for department meetings during the SMT department meeting.

### B. Office of Planning, Research & Institutional Effectiveness requests

1. Requested data for PIF grant, Transfer Pods Initiative. The data suggested that STEM is one of the more popular transfer majors at Skyline College. Approximately 23% of all Fall 2013 applicants and admitted students to SFSU, Skyline College's largest feeder school, applied under a STEM major.

C. Faculty and Staff hiring, Instructional Equipment and Facilities Requests  
Complete the following table:

Personnel:

Needs - Chemistry Instructor (General) - Chemistry Faculty (Biochemistry/Biotech)

How does this request align with your assessment of student outcomes?

The FTE/PTE ratio is under 50% for the chemistry department.

How does this request align with your action plan?

We have request in the action plan the need for at least two full time faculty.

Equipment:

Needs - NMR - 80MHz

How does this request align with your assessment of student outcomes?

This instrument is crucial for organic chemistry learning. Currently our course doesn't transfer to San Jose State University because we don't have that piece of equipment in our laboratory. This equipment is also recommended by the American Chemical Society office in the ACS Guidelines for Chemistry in Two-Year Colleges. See link: <http://www.acs.org/content/acs/en/education/policies/twoyearcollege.html>.

How does this request align with your action plan?

This instrument will be used in both sections of organic chemistry and in chemistry for allied health with biotechnology focus.

Estimated cost for facilities and equipment.

\$61,000

Facilities:

Needs - Additional Lab space (2) - Adjunct office for chemistry faculty

How does this request align with your assessment of student outcomes?



1. Next semester we will have an expansion of the section for CHEM 192 and we will have to add more section. In addition we are currently sharing laboratory space with physics and geology. This situation may cause scheduling conflict and an impact on enrollment. Students do not want to attend course on a Friday afternoon.

2. Our faculty lounge is too small for the amount of adjunct faculty that serves the SMT department. The chemistry department will like to have a space for all chemistry adjunct faculty to hold office hours.

How does this request align with your action plan?

1. There is a potential scheduling conflict of classroom for chemistry, physics and geology.