#12

COMPLETE

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Page 1: I. Program Overview and Update

Q1

I.1. Department(s) Reviewed:

Chemistry

Q2

I.2. Lead Author:

Robert Anness

Q3

I.3. Collaborator(s) - list of any person that participated in the preparation of this report:

Respondent skipped this question

Q4

I.4. Dean/Manager(s):

Kim Dudzik

Q5

Initial Collaboration Date with Manager/Dean:

Enter the initial date you met with your dean to discuss your program review using this format: MM/DD/YYYY **12/16/2021**

Q6

I.5. Program Update (Required): Please summarize the changes, additions, and achievements that have occurred in your program since your last program review was submitted. To access your Spring 2021 program review, visit the Program Review webpage.

While 2020 represented an abrupt transition to remote teaching, the availability of the COVID-19 vaccines in 2021 has allowed us to begin offering some face-to-face lab sessions again to a greater or lesser extent depending on the class. In Fall 2021, our introductory chemistry courses (Chem 102 and 120) held a few lab sessions while our general chemistry (Chem 141 and 142) and organic chemistry courses (Chem 231 and 232) had students coming to campus for lab experiments every week or two (Lab sessions were offered to a lesser extent for general and organic chem courses during Spring 2021 as well). All of these face-to face sessions were set up to allow for some distancing, and masks were required at all times. We are scheduled to hold all of our chemistry classes at full capacity and in person beginning in Spring 2022, so it was important for our students, faculty and laboratory technicians that we started to offer on-campus lab sessions again on some scale during the last couple of semesters in preparation for this shift.

Starting in Fall 2020, Embedded Learning Assistants (ELAs) have been utilized in some sections of our highest risk (lowest success and retention rates) chemistry courses. The ELA program is being funded by the Title III HSI-STEM grant that we were awarded back in the Fall of 2016. Early results have been mixed but efforts are being made to refine this program to increase its effectiveness.

The chemistry department is currently working on SLO revisions in three of our courses to pare down the number of SLOs. Discussions have been ongoing with regard to making classroom assessments both more manageable and more meaningful.

The Chemistry Department is continuing to request a new full-time, tenure-track instructor as a replacement for our retired faculty member. This loss reduced the number of full-time faculty in our department by one-third and leaves us without a dedicated coordinator and full-time faculty instructor for Chemistry 120, which will hinder efforts toward improvement and innovation in that course. This is particularly important since Chemistry 120 is an introductory class that serves as preparation for, but also as a gateway to all of our other chemistry classes. Student success and retention rates are consistently lowest in Chem 120 among our chemistry classes (success rates averaging 52% from Fall 2016 to Spring 2021, compared to approximately 70% for chemistry as a whole over the same time frame), and IESE data shows clear equity gaps when comparing various groups (see Part B below for details). Therefore, hiring a new full-time chemistry instructor that can coordinate Chemistry 120 remains a critical need for our department.

Page 2: II. Assessment and Student Achievement

Q7

II.A.1. Describe the progress your program has made in your 4-year assessment cycle. Include any assessment results your department has found and changes you have made as a result. If your assessment plan has changed, please upload this new plan as well.

After suspending SLO assessment during the Spring 2020 semester due to the onset of the pandemic. The Chemistry Department did resume SLO assessment in the Fall 2020 semester. However, with so many new variables it is difficult to abstract these results from their context and provide any meaningful comparison to previous semesters. Virtually all of our faculty had to learn to teach remotely for the first time, and the majority of our students lack experience in online learning as well. Some classes were taught synchronously while others were asynchronous in Fall 2020, though all chemistry classes were synchronous as of Spring 2021. Classroom assessments such as homework, quizzes and exams were being administered for the first time via online publisher platforms such as WileyPlus and Cengage's OWL. These changes, along with lab activities being mostly online until Fall 2021, are so significantly different than what faculty and students are used to that assessment results obtained at this time, whether promising or not, are likely a result of the changed environment more so than anything else.

Through discussions with SLO coordinator Tania Jabour and others, as well as an evolving understanding of how best to develop and use outcomes assessment in the classroom, we've recognized that some of our chemistry classes have too many SLOs. For example, Chem 102 has 12 SLOs while Chem 120 and Chem 231 each have 7. Rather than continue with our current SLO assessment plan for these courses, we've decided that it would be best to rewrite the SLOs for these classes. The goal is to finalize these changes by the Spring 2022 Professional Development week so that the updated course outlines can be submitted to curriculum during the Spring 2022 semester. A new assessment cycle plan will need to be created based on the revised SLOs.

Q8

Respondent skipped this question

OPTIONAL: You may upload a copy of your SLO assessment plan here. If you have an Excel sheet, please convert it to one of the supported files listed below before submission.

Page 3: II. Assessment and Student Achievement

Q9

II.B.1. What progress has been made in your program to address the institutional goals set around student success and equity? {2019 Equity Plan} If qualitative or quantitative data is available, please summarize any findings.

Both male and female chemistry students have tended to have success rates that are very close to the overall success rate in chemistry (69%) over the past five years. Female students tended to have success rates that were slightly higher (71%) than the average success rate in any given semester while male students tended to be slightly lower (67%), but no equity gap is discernible from the data (Graph available upon request).

Chemistry success rates with regard to ethnicity were analyzed by comparing success rates of particular groups as a percent difference from the average rates (Graph available upon request). Comparing our two largest groups first (White, Non-Hispanic and Hispanic), there is a significant equity gap evidenced by their success rates. While white, non-Hispanic students had higher success rates than the overall rate (averaging 11% above average) over the past five years, Hispanic/Latinx students had lower success rates each semester (averaging 19% below average). Other ethnic groups tended to fluctuate above or below the average success rate depending on the semester. This is most likely due to the fact that these groups represent a much smaller percentage of overall enrollment in chemistry, and so the sample sizes are quite small. However, it should be noted that while the success rates for Asian students tended to be above the average most semesters (averaging 13% above), African-American students had below average success rates every semester over the past five years (averaging 37% below average), representing a significant equity gap.

While no single program or institution can address all of the societal factors that negatively affect so many of our students, it is our job to understand and minimize the effects of these factors as much as possible. Over the last several years the Chemistry Department at Cuyamaca College has been collaborating with faculty from biology, physics and engineering to develop and enhance existing parts of a comprehensive network of student support for STEM students. This work is being carried out with the goal of providing significant assistance to disproportionately impacted students in an effort to close equity gaps as much as possible. The work has been bolstered by the award of a Department of Education Title III HSI-STEM grant entitled STEM Guided Pathways and Transformational Teaching Practices. The grant was awarded in October of 2016 and it has an annual budget of $1.2 million for a 5-year period. This grant project addresses key challenges and seeks opportunities for innovation and improvement. There is a focus on building and supporting a STEM Guided Pathway in the Science & Engineering Departments, the creation and development of programs and interventions intended to become sustainable, the development of curriculum in the sciences that will serve to increase retention and success, and enhanced collaboration with partners on campus while creating additional STEM transfer degrees. Student support structures offered via the grant project have included faculty mentorship and 2-week STEM Summer Boot Camp for STEM cohort students, dedicated STEM academic advising, science games in the STEM Center (e.g. Periodic Table bingo, chemistry relay team game, chemistry card game & biology jeopardy), quiet study areas, a science & engineering tutoring area, study skills workshops and course-specific workshops for students in our entry-level chemistry and biology classes. We've also hosted a variety of panel discussions, presentations and events related to STEM careers and summer research opportunities for students. Faculty training and mentorship of students has been an important aspect of our grant-related work as well.

Unfortunately, over the last couple of years our efforts have been largely stifled due to the onset of the pandemic and the inability to use the STEM center in the H-Building due to the campus closure. However, while most of these activities ground to an abrupt halt at the start of the pandemic, over the last year efforts have been made to resume as many student support interventions as possible, albeit in modified form, and to create new ones. For example, the boot camp and summer research experiences were modified to be online activities. STEM counseling and student mentoring have continued online as well. Embedded Learning Assistants (ELAs) were piloted in high-risk courses including Chemistry 102 and 120 during the Fall 2020 semester. The Assistants led co-curricular and extracurricular workshops, open study group sessions, guided homework and test preparation sessions. Perception data collected at the end of each session reflected positive student experiences. In Fall 2020, 86% of participants strongly agreed that the value they obtained from attending the sessions was worth the time invested. However, the results from the first couple of semesters of the ELA pilot program have been mixed. On the positive side, students in Chem 120 sections with an embedded learning assistant experienced higher retention (90%) and success rates (67%) when compared to the college-wide population enrolled in Chem 120 without an ELA (80% and 57%, respectively). Results for Chem 102 were less promising as students enrolled in ELA sections experienced lower retention (73%) and success rates (57%) compared to those in non-ELA Chem 102 sections (92% and 83%, respectively). These mixed results suggest further refinement of the ELA program is necessary. Focus groups were conducted for students, faculty and participants to assess future improvements. These groups highlighted a need for a more formal training program for ELAs and faculty. Also, it should be noted that attendance in ELA-led sessions was inconsistent among students, and focus group commentary suggested that students who participated in workshops were not the ones who need the most assistance.

Q10

II.B.2. In light of the goals set in your program review, what are your plans to improve equitable student outcomes (success, retention, persistence, graduation, etc.) in the coming year?

Given that the lowest success and retention rates are concentrated in our introductory chemistry courses (Chem 102 and 120), we continue to put the largest focus on providing support for students in those classes. For example, the embedded learning assistant (ELA) program described in the previous section of this report will continue for these courses. In response to focus group feedback, The STEM grant coordinators are working with the Cuyamaca College tutoring department, counseling services, and transfer center to provide extensive training to the ELA pool. In addition to collecting attendance, success and retention data for the ELA courses, student ELAs have also been completing weekly journal reflections since the Spring 2021 semester.

We will also be hosting pre-semester Gear Up for Success workshops for incoming Chem 102 and 120 students that focus on reviewing math skills, conducting problem solving activities, and highlighting good study strategies necessary for success in these courses. Spring 2022 will be the first time these sessions will be hosted in person since before the pandemic. We expect to resume our Gear Up for Chem 141 workshop as well.

Q11

II.B.3. What did your program learn from the transition to remote teaching and operations over the past year? How can this be used to improve the student experience in the future?

The overall experience of converting all our chemistry classes to remote teaching has not been positive. The process has put a much larger burden on instructors as we had to quickly learn multiple new software platforms for online lab instruction, homework, and testing, in addition to learning how to teach on Zoom. The complete revision of our lab curriculum to less effective, online platforms was an enormous undertaking. All of this has contributed to overwork and burnout among instructors in general.

Students have also been highly demotivated as these challenging chemistry courses require focus that is difficult for many to maintain over Zoom, and without the community of their peers that is much more easily developed when students share physical lecture and lab spaces together for six to nine hours a week. Equity issues for students (and faculty) have been exacerbated as well given that access to technology varies widely, and not everyone has a home environment that is suitable for learning (or teaching).

The experience over this last period has only reinforced how critical the in-person and hands-on aspects of our chemistry classes are to teaching and student learning. However, the skills learned by necessity over the past couple years via more in-depth Canvas training or by employing publisher software platforms are valuable, and much can be utilized in in our chemistry courses as we transition back to face-to-face teaching. Instructors should definitely have an understanding of how to use Canvas much more effectively than they did before the pandemic. For example, the Canvas Discussion feature can be useful even when a class meets regularly in person to promote conversations that may be less suitable for class sessions. The Canvas training offered many other strategies for promoting student engagement and participation that will continue to be of value. In addition, the chemistry department has become much more familiar with textbook publisher software programs that weren't being utilized pre-pandemic. Though it is not likely that we will be using these platforms for exams and quizzes when classes are face-to-face (as has been the case since the switch to remote teaching), we will likely still use the online homework, study guides and other practice resources offered by these platforms. Moreover, these platforms generally include an e-book copy of the text, and the full software bundle is always much less expensive that the cost of a new hardcopy of one of our chemistry textbooks.

Q12 **No**

II.B.4. Is your program a career education program (e.g., does it prepare students to directly enter the workforce)?

Page 4: II. Assessment and Student Achievement continued

Q13

II.B.5. Please share your observations about the employment rate for your program over the past several years.

Respondent skipped this question

Q14

II.B.6. What is the institution-set standard for your program’s employment rate? The institution set standard is what you would consider the lowest acceptable employment rate for your program (or “floor”).

Respondent skipped this question

Q15

II.B.7. What would you like your program’s employment rate to be, ideally (stretch goal)?

Respondent skipped this question

Page 5: II. Assessment and Student Achievement continued

Q16

Does your department offer classes that are approved distance education courses excluding emergency remote teaching in 2020-21 (classes that would have been taught in person if not for the pandemic)?

No

Page 6: II. Assessment and Student Achievement

Q17

II.C.1. If there were differences in success rates for distance education (online) versus in-person sections of program courses in your last comprehensive program review, what has the department done to address these disparities? If online and in-person sections had comparable success rates, please describe what the program did to achieve that.

Respondent skipped this question

Page 7: III. Previous Goals: Update

Q18

1. Previous Goal 1:

Success in STEM Presentations/Workshops/Interventions

Q19

2. Which College Strategic Goal does this department goal most directly support? (Check only one)

Guided Student Pathways

Q20

3. Goal Status

In Progress - will carry this goal forward into next year

Page 8: III. Previous Goals: Update continued

Q21

Please describe the results or explain the reason for deletion/completion of the goal:

Respondent skipped this question

Q22

Do you have another goal to update?

Respondent skipped this question

Page 9: III. Previous Goals: Update continued

Q23

Action Steps for the Next Year: If you are requesting resources in order to achieve this goal, please list them below as action steps and specify the type of request (e.g., submit technology request for new laptop computers).

Activities funded by the Title III HSI-STEM grant will continue into next year. As mentioned in Section II.B of this report, an embedded learning assistant (ELA) program was piloted in Fall 2020 and these assistants will continue to offer workshops, study group sessions, homework guidance and test preparation services in some sections of our highest risk chemistry classes (Chem 102 and 120). Students participating in our STEM Guided Pathways Scholars cohort will continue to have access to our STEM Summer Boot Camp, monthly meetings with a faculty mentor, a dedicated STEM counselor, early registration privileges, a foundation science course (SCI 100), and STEM transfer immersion experiences at partner 4-year colleges. Summer Research Opportunities and other STEM internships will continue to be promoted to all of our chemistry students, and we will host in-person pre-semester “Gear Up for Success” workshops for incoming Chem 102 and 120 students.

Q24

Do you have another goal to update?

Yes

Page 10: III. Previous Goals: Update continued

Q25

1. Previous Goal 2:

Measurement of Effectiveness of the STEM Guided Pathways Project through Data Collection and Analysis.

Q26

2. Which College Strategic Goal does this department goal most directly support? (Check only one)

Guided Student Pathways

Q27

3. Goal Status

In Progress-will carry this goal forward into next year

Page 11: III. Previous Goals: Update continued

Q28

Please describe the results or explain the reason for deletion/completion of the goal:

Respondent skipped this question

Q29

Do you have another goal to update?

Respondent skipped this question

Page 12: III. Previous Goals: Update (If Applicable) continued

Q30

Action Steps for the Next Year: If you are requesting resources in order to achieve this goal, please list them below as action steps and specify the type of request (e.g., submit technology request for new laptop computers).

STEM majors and cohort student data is being collected and studied to gain an understanding of Cuyamaca STEM student population demographics, implementation of the various interventions, including STEM Counseling, support courses, Faculty Mentorship, STEM cohort science identity, student success, student retention and time to transfer, among others. These results compare the success and retention of our STEM cohort students versus STEM students in general with demographics similar to our cohort students. While the majority of the support services mentioned above are available to all of our STEM students, the cohort students are required to take advantage of them and so tracking their progress can give us some indication of the effectiveness of these interventions.

In Fall 2020, evaluation studies of the 2017 (first) cohort were conducted. The studies showed program strengths as well as areas in need of improvement. Below is some data obtained by the HSI-STEM grant team as reported by the grant program director, Charlene Alsbaugh:

Program strengths:

- One hundred percent (100%) of the 2017 STEM cohort created an education plan within one year of enrollment. Target Outcome: 75% of the treatment group completes an education plan.
- Eighty percent (80%) of the 2017 STEM cohort students who participated in Boot Camp were retained in a STEM major and experienced significantly higher fall-to-fall persistence rates than first- generation, first-entering STEM Students (80% vs. 43%). Boot Camp students also obtained a higher first semester GPA, 3.21 vs. 2.72. Target Outcome: 75% of the treatment group persists from the first fall to spring semester.
- Seventy-five percent (75%) of the 2017 STEM cohort students who participated in SCI 100 were retained in a STEM major for the length of their community college enrollment, regardless of the length of time they received faculty mentoring. Target Outcome: At least 80% persist to the next semester.
- Ninety-four (94%) of the 2017 STEM cohort who received the coaching intervention returned for a second year. Target Outcome: At least 70% of the treatment group returns for a second year.
- Twenty-five percent (25%) of the 2017 STEM cohort participated in the Summer Transfer Immersion experience at a partner university. Of those participants, 100% transferred to a 4-year university.

Areas in need of improvement:

- Of those students who remained in coaching for the program’s length and received dedicated counseling at regular intervals, 38% transferred within 36 months of enrollment. Seventy- eight percent (78%) transferred within five years of their initial enrollment date. Target Outcome: At least 65% of the treatment group graduate or are retained by the third year.
- While target groups of Hispanic and First-entering students within the cohort are persisting in STEM majors, significant progress has not been made in improving the STEM course retention and success rates, thereby extending the time to transfer.

Over the coming year, STEM Guided Pathways Project data will continue to be collected and assessed with the goal of refining and improving the program to maximize its effectiveness.

Q31 **No**

Do you have another goal to update?

Page 13: III. Previous Goals: Update continued

Q32 **Respondent skipped this question**

1. Previous Goal 3:

Q33 **Respondent skipped this question**

2. Which College Strategic Goal does this department goal most directly support? (Check only one)

Q34 **Respondent skipped this question**

3. Goal Status

Page 14: III. Previous Goals: Update continued

Q35 **Respondent skipped this question**

Please describe the results or explain the reason for deletion/completion of the goal:

Q36 **Respondent skipped this question**

Do you have another goal to update?

Page 15: III. Previous Goals: Update continued

Q37 **Respondent skipped this question**

Action Steps for the Next Year: If you are requesting resources in order to achieve this goal, please list them below as action steps and specify the type of request (e.g., submit technology request for new laptop computers).

Q38 **Respondent skipped this question**

Do you have another goal to update?

Page 16: III. Previous Goals: Update continued

Q39 **Respondent skipped this question**

1. Previous Goal 4:

Q40 **Respondent skipped this question**

2. Which College Strategic Goal does this department goal most directly support? (Check only one)

Q41 **Respondent skipped this question**

3. Goal Status

Page 17: III. Previous Goals: Update continued

Q42 **Respondent skipped this question**

Please describe the results or explain the reason for deletion/completion of the goal:

Page 18: III. Previous Goals: Update continued

Q43 **Respondent skipped this question**

Action Steps for the Next Year: If you are requesting resources in order to achieve this goal, please list them below as action steps and specify the type of request (e.g., submit technology request for new laptop computers).

Page 19: IV. New Goals

Q44 **No**

Would you like to propose any new goal(s)?

Page 20: IV. New Goals continued

Q45 **Respondent skipped this question**

1. New Goal 1:

Q46 **Respondent skipped this question**

2. Which College Strategic Goal does this department goal most directly support? (Check only one)

Q47 **Respondent skipped this question**

3. Please describe how this goal advances the college strategic goal(s) identified above.

Q48

Respondent skipped this question

4. Please indicate how this goal was informed by SLO (student learning outcomes) assessment results, PLO (program learning outcomes) assessment results, student achievement data, or other qualitative or quantitative data (from any source):

Q49

Respondent skipped this question

5. Action Steps for this Year: If you are requesting resources in order to achieve this goal, please list them below as action steps and specify the type of request (e.g., submit technology request for new computer hardware).

Q50

Respondent skipped this question

6. How will this goal be evaluated?

Q51

Respondent skipped this question

Do you have another New Goal?

Page 21: IV. New Goals continued

Q52

Respondent skipped this question

1. New Goal 2:

Q53

Respondent skipped this question

2. Which College Strategic Goal does this department goal most directly support? (Check only one)

Q54

Respondent skipped this question

3. Please describe how this goal advances the college strategic goal(s) identified above.

Q55

Respondent skipped this question

4. Please indicate how this goal was informed by SLO (student learning outcomes) assessment results, PLO (program learning outcomes) assessment results, student achievement data, or other qualitative or quantitative data (from any source):

Q56

5. Action Steps for this Year: If you are requesting resources in order to achieve this goal, please list them below as action steps and specify the type of request (e.g., submit technology request for new computer hardware).

Respondent skipped this question

Q57

6. How will this goal be evaluated?

Respondent skipped this question

Q58

Do you have another New Goal?

Respondent skipped this question

Page 22: IV. New Goals continued

Q59

1. New Goal 3:

Respondent skipped this question

Q60

2. Which College Strategic Goal does this department goal most directly support? (Check only one)

Respondent skipped this question

Q61

3. Please describe how this goal advances the college strategic goal(s) identified above.

Respondent skipped this question

Q62

4. Please indicate how this goal was informed by SLO (student learning outcomes) assessment results, PLO (program learning outcomes) assessment results, student achievement data, or other qualitative or quantitative data (from any source):

Respondent skipped this question

Q63

5. Action Steps for this Year: If you are requesting resources in order to achieve this goal, please list them below as action steps and specify the type of request (e.g., submit technology request for new computer hardware).

Respondent skipped this question

Q64

6. How will this goal be evaluated?

Respondent skipped this question

Q65 **Respondent skipped this question**

Do you have another New Goal?

Page 23: IV. New Goals continued

Q66 **Respondent skipped this question**

1. New Goal 4:

Q67 **Respondent skipped this question**

2. Which College Strategic Goal does this department goal most directly support? (Check only one)

Q68 **Respondent skipped this question**

3. Please describe how this goal advances the college strategic goal(s) identified above.

Q69 **Respondent skipped this question**

4. Please indicate how this goal was informed by SLO (student learning outcomes) assessment results, PLO (program learning outcomes) assessment results, student achievement data, or other qualitative or quantitative data (from any source):

Q70 **Respondent skipped this question**

5. Action Steps for this Year: If you are requesting resources in order to achieve this goal, please list them below as action steps and specify the type of request (e.g., submit technology request for new computer hardware).

Q71 **Respondent skipped this question**

6. How will this goal be evaluated?

Page 24: Resources Needed to Achieve Program Goal(s)

Q72 **Faculty Resource Needs**

What resources is your program requesting this year to achieve the program's goals? (Check all that apply)

Page 26: Final Check

Q73	I am ready to submit my program review
Are you ready to submit your program review?If you would like to go back and review a section, select a section a click "Next."	