#12

COMPLETE

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Page 1: I. Program Overview and Update

Q1

1. Department(s) Reviewed:

Chemistry

Q2

2. Lead Author:

Robert Anness

Q3

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

Respondent skipped this question

Q4

4. Dean/Manager(s):

Tammi Marshall

Q5

5. Initial Collaboration Date with Manager/Dean:

Enter the initial date you met **12/06/2023** with your dean to discuss your program review using this format: MM/DD/YYYY

Q6

6. Program Update (Required): Please summarize the changes, additions, and achievements that have occurred in your program since the last program review. You can access 2022 program reviews on the program review webpage.

The most significant change since last year's program review was the addition of a new full-time, tenure-track faculty member in our department. This was a critical new hire not only because this position was a retirement replacement and we are a small department, but also in light of our core goals. As discussed in detail later in this report, we are working diligently to increase success and retention rates while eliminating equity gaps in our introductory chemistry courses. The course with the consistently lowest success rate is Chemistry 120, and we were without a dedicated coordinator for this class until our new hire, Theresa Carlson, came on board this Fall and took on the role. Theresa is well suited for this role as she is in the final stages of completing an EdD degree with a focus on using technology to help close equity gaps in STEM classes. Already in her first full-time semester at Cuyamaca she has collaborated with the Student Success and Equity Council (SSEC) to analyze Chem 120 data and discuss ideas for class improvements. This has been a great start along the path to achieving our core goals.

Page 2: II. Assessment and Student Achievement

Q7   **Yes**

7. Did your program complete and submit SLO assessment in the last year? If you are unsure, check the most recent updates on your program's SLO Assessment Updates.

Q8

7a. Which SLOs did you assess in the last year?If you did not assess in the last year, please share why, including whether your program is experiencing barriers to assessment or data submission, and/or if your program would benefit from outcomes and assessment support.

The SLO coordinators have suggested assessing all SLOs for a particular class during a given semester and then reassessing in accordance with an assessment cycle plan, or more often if desired. The chemistry department adopted this approach as of Spring 2021, and over the past year we have submitted assessment results for SLOs in all of our active chemistry classes (Chem 102, 120, 141, 142, 231 and 232). All of the SLOs in these classes have been assessed and submitted with the exception of two Chem 231 SLOs that were assessed during the Fall 2023 semester. These assessments in our chemistry classes give us a baseline of information to discuss at upcoming department SLO meetings, allowing us to focus on problem areas in our courses and brainstorm ideas to improve results. We can also use subsequent semesters in the four-year cycle for PLO assessment and reassessments of specific SLOs.

Q9

8. Please share any outcomes assessment projects your program has worked on in the last year, including SLOs on Canvas, PLOs by ACP, Equitable Assessment Strategies (innovative collective/common assessments, project-based, work-based learning, student-centered, etc.), or other.

Chemistry 102 was one of the courses in which the SLOs were revised recently, and we decided to assess the new set of SLOs during the Spring 2022 semester. One thing we have noticed in this class over the years is that SLOs assessed at the end of the semester tend to give less successful results than those assessed earlier. This may be related to a certain amount of stress and fatigue that sets in by the end of this accelerated class. Chem 102 is a course for allied health majors that gives students an overview of general chemistry, organic chemistry and biochemistry in a single semester. The material is very challenging for these students and they can tend to feel pretty overloaded by the end of the semester. One idea to address this issue is to replace the students' fourth exam with a project (such as a poster or PowerPoint presentation) that incorporates the key concepts that would have been tested on the exam. There would be ample opportunities for feedback as they work on their project and hopefully this would alleviate some of the stress that builds up around this time of the semester, allowing them to finish more strongly. This project would be used as an assessment tool related to one or more of the course SLOs. In general, we have found that exam-based assessments, particularly in our introductory courses, often give undesirable results. This is likely in part a result of the stress and anxiety associated with exams. With this in mind we plan to work toward more meaningful SLO assessments that are not tied to exams or quizzes.

On a separate note, The STEM Department Chairs collaborated in August 2021 to create a set of PLOs that apply to our ACP as a whole. These along with chemistry-specific PLOs will be assessed as part of our four-year assessment cycle, and they will be mapped to existing SLOs.

Q10

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

Respondent skipped this question

Page 3: II. Assessment and Student Achievement

Q11

9. Please discuss any equity gaps in access or success

Both male and female chemistry students have tended to have success rates that are very close to the overall success rate in chemistry (71%) over the past five years. The average success rate was 72% for female students and 70% for male students, showing no discernible equity gap.

Chemistry success rates with regard to ethnicity were analyzed by comparing success rates of particular groups as a percent difference from the average rates. 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 12% above average) over the past five years, Hispanic/Latinx students had lower success rates each semester (averaging 18% 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 18% above), African-American students had below average success rates in all but two semesters over the past five years (averaging 35% below average), representing a significant equity gap.

Q12

10. What action will the department or discipline take to address these equity gaps? If equity gaps have been reduced or eliminated, please share what the program did to achieve this. If equity gaps still exist, consider the specific steps your department will take to address equity gaps.

Our preparatory chemistry course for STEM majors, Chemistry 120, has the lowest success rate, averaging 52% from Fall 2018 to Spring 2023, compared to approximately 71% for chemistry as a whole over the same time frame. The second lowest success rate over the last five years is 63% for Chem 102, which is our introductory chemistry class for allied health majors.

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, we would like to secure funding for embedded learning assistants to be placed in these classrooms. The embedded learning assistant (ELA) program was piloted in these classes a couple years ago with funding from a Title III HSI-STEM grant that has since reached the end of its funding period.

The chemistry department will continue 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.

While most of the focus has been on creating support activities and networks to aid students in these introductory chemistry classes, a new goal for the next several years will be to take a hard look at our chemistry 120 class itself from a pedagogical standpoint and revamp it. The idea behind Chemistry 120 is that it will help students cultivate the study habits, lab skills, and content knowledge for them to be successful in their subsequent transfer-level chemistry courses. While this may be working for some students, unfortunately overall Chemistry 120 seems to be operating less like a bridge to success and more like a filter that's holding many students back. It should be noted that there have been student-centered teaching practices implemented in Chem 120 over the last several years. These include flipped classroom activities and project-based learning activities such as poster presentations. Moreover, individual and group problem solving sessions during lecture are commonplace in this class, including organizing the class into pods. In this format each pod (group) gets assigned their own problem or problems to solve, and then they share their work with the rest of the class and demonstrate how they solved it. Despite this active-learning focus in this class, there has not been notable improvement in Chem 120 success rates over the last five years. Deeper departmental reflection and discussion through an equity lens will be needed to address these ongoing issues with retention and success rates, with the goal of significantly improving both.

Contributing to the challenges faced by Chemistry 120, the class has been somewhat rudderless since our long-time Chemistry 120 coordinator retired during the Spring 2020 semester. The other two remaining full-time instructors in the department coordinate our general chemistry series (Chem 141 and Chem 142) and our organic chemistry series (Chem 231 and Chem 232). A dedicated coordinator for each these areas within our discipline (preparatory chemistry, general chemistry and organic chemistry) is crucial for advancing the goals of the department. Fortunately, Theresa Carlson was hired as a new full-time, tenure-track chemistry instructor for the Fall 2023 semester and she has enthusiastically taken on the role as the Chemistry 120 coordinator. There have already been new pedagogical methods brought into the Chem 120 class for the Fall 2023 semester. One innovative teaching method Theresa employs in her classroom is the use of QR codes. These codes are generally displayed on a PowerPoint slide associated with an example problem. Once students complete the problem they can scan the code with their phones and submit their answers online. A few opportunities like this are provided throughout each lecture, which allows Theresa to see how students are doing with the material. She can then reach out to students individually when she sees that they are struggling to provide additional support and guidance.

Q13

11. How has this data impacted the goals set in your previous comprehensive program review?

The goals set in our previous comprehensive program review are all intended to improve equitable outcomes in student success and retention rates in our chemistry courses. As previously discussed, success rates are lowest in our introductory chemistry courses (Chem 102 and 120), so most of our action items related to these goals are focused on gaining understanding through data analysis, bolstering support systems for students in these classes, and making pedagogical improvements.

Q14

12. Please describe the most significant or impactful ways your program worked across the college to advance the college's vision of equity, excellence and social justice through education over the past year.

The Chemistry Department collaborated with the Cuyamaca College Student Success and Equity Council (SSEC) to explore data related to Chemistry 120. SSEC has been doing data dives on highly-enrolled classes that tend to show consistent equity gaps in success and retention rates. The goal of this collaboration is to analyze trends revealed by the data and brainstorm ideas for reducing equity gaps in Chemistry 120.

Q15

13. What challenges is your program still experiencing due to the disruption of operations caused by the pandemic and the need to offer services in various modalities?

The experience with distance education in our chemistry courses during the pandemic was generally not positive, so we are currently only offering our chemistry classes in the face-to-face modality. Enrollments in our chemistry classes since the pandemic have been mixed, with a few of our classes still seeing waitlists, and some sections that are under-enrolled. On the whole, however, there has been a significant drop in chemistry course enrollment since the peak in Spring 2020. While there does appear to be an increasing enrollment trend since Spring 2022, we've had to make changes to our course offerings each semester to adapt to these enrollment related issues and needs.

Q16

OPTIONAL: Please upload any documentation you would like to include as part of your responses to this section of the program review.

Respondent skipped this question

Page 4: II. Assessment and Student Achievement continued

Q17

11. Does your department offer classes that are approved distance education courses?

No

Page 5: DE Course Success Rates

Q18

12. 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 6: III. Previous Goals: Update

Q19

Previous Goal 1:

Success in STEM Presentations/Workshops/Interventions

Q20

Previous Goal 1:

Deleted

Page 7: III. Previous Goals: Update continued

Q21

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

After considering some of the feedback from our last Program Review report and a discussion with the Division 1 Dean, it was determined that this goal is significantly related to Previous Goal 2 in overall objective. As a result of this reflection, Previous Goal 2 is being edited to incorporate aspects of this goal and its associated action steps.

Q22

Do you have another goal to update?

Yes

Page 8: III. Previous Goals: Update continued

Q23

Link to College Strategic Goal - Which College Strategic Goal does this department goal most directly support? (Check only one)

Respondent skipped this question

Q24

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).

Respondent skipped this question

Q25

What resources, if any, are needed to achieve this goal? Please select all that apply. Links to request forms are included below. All resource requests are due on the program review deadline.

Respondent skipped this question

Q26

Do you have another goal to update?

Respondent skipped this question

Page 9: III. Previous Goals: Update continued

Q27

1. Previous Goal 2:

Address key factors leading to equity gaps and low success rates in Chemistry 120 through data exploration, implementation of course improvements to increase student engagement, and promotion of a variety of support networks and activities.

Q28

3. Goal Status

In Progress-will carry this goal forward into next year

Page 10: III. Previous Goals: Update continued

Q29

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

Respondent skipped this question

Q30

Do you have another goal to update?

Respondent skipped this question

Page 11: III. Previous Goals: Update (If Applicable) continued

Q31

Link to College Strategic Goal - Which College Strategic Goal does this department goal most directly support? (Check only one)

Eliminate equity gaps in course success (passing grade in class)

Q32

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).

This goal has been edited and expanded to include some aspects of Previous Goal 1, which is being deleted in this report. Since both previous goals have the overall objective of increasing success and retention rates while eliminating equity gaps in our introductory chemistry courses, it made sense to combine them.

Key to addressing the challenges related to this goal was the hiring of a new full-time faculty member who could teach and coordinate our Chemistry 120 classes. Given that this position is brand new, progress toward this goal is still in the very early stages. Theresa Carlson is teaching and coordinating our Cuyamaca Chemistry 120 classes for the first time as of the Fall 2023 semester. However, she has already participated in a collaboration between the Chemistry Department and the Student Success and Equity Council (SSEC) to work toward reducing equity gaps in Chem 120. This involved taking a deep dive into the college Chem 120 data to analyze trends and see which demographics experienced the largest equity gaps. Starting from this baseline of data, the goal of this collaboration was to brainstorm ideas for mitigating these gaps. The wide-ranging discussion fostered by this process has given us an abundance of insights, identified problem-areas to focus on, and provided concrete steps to consider moving forward.

Over the next year, the Chemistry Department faculty will meet to discuss ideas for innovative pedagogical approaches that could be used in the Chemistry 120 classroom to increase student engagement and content understanding. Our department is participating in a community of practice called the "SEED" program which will continue to be helpful in this regard. The SEED program is an interdepartmental collaboration between science and engineering faculty designed as a forum for sharing, fine-tuning and developing innovative and equity-minded teaching practices. We will need to devise data collection and analysis methods related to the new types of projects and teaching/learning practices that we employ.

Our department will also discuss new types of SLO assessments that are not tied to exams, and SLO data will be collected according to our program's four-year cycle.

We would like to secure funding for incorporating embedded learning assistants (ELAs) into our Chemistry 120 classes. We had an opportunity to participate in the ELA pilot program in Fall 2020 and saw positive results with regard to Chem 120 based on data collected via the Title III HSI-STEM grant. Since the grant funding period has ended, we will likely need to reach out to the Office of Institutional Effectiveness, Success and Equity (IESE) at Cuyamaca College to assist with data collection and analysis. The STEM departments at Cuyamaca and Grossmont Colleges are also planning to work on a National Science Foundation (NSF) grant that could potentially fund more communities of practice, training opportunities for new STEM faculty, and ELAs.

We will continue to work with STEM counselors on degree maps related to our program. Three-year chemistry degree maps for transfer to UC and CSU schools were completed recently, and there is a plan to develop two-year maps before the end of the Spring 2024 semester.

We will continue to work with our STEM ACP lead (Christina Burnett) to promote the following:

•Events related to STEM careers and transfer to four-year institutions.
•Opportunities for STEM-related internships and summer research programs.
•Success in STEM activities on campus.

The Cuyamaca Math Department has received funding to create math-related Canvas modules that can be used by other disciplines. We would like to work with them to develop some modules designed to reinforce core math skills required for success in chemistry. These modules can then be utilized in our courses as needed to provide review and/or practice of mathematical concepts and operations that are essential to problem solving in chemistry.

Q33

What resources, if any, are needed to achieve this goal? Please select all that apply. Links to request forms are included below. All resource requests are due on the program review deadline.

Supplies, equipment, and/or furniture

Q34

Do you have another goal to update?

No

Page 12: III. Previous Goals: Update continued

Q35

1. Previous Goal 3:

Respondent skipped this question

Q36

3. Goal Status

Respondent skipped this question

Page 13: III. Previous Goals: Update continued

Q37

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

Respondent skipped this question

Q38

Do you have another goal to update?

Respondent skipped this question

Page 14: III. Previous Goals: Update continued

Q39

Link to College Strategic Goal - Which College Strategic Goal does this department goal most directly support? (Check only one)

Respondent skipped this question

Q40

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).

Respondent skipped this question

Q41

What resources, if any, are needed to achieve this goal? Please select all that apply. Links to request forms are included below. All resource requests are due on the program review deadline.

Respondent skipped this question

Q42

Do you have another goal to update?

Respondent skipped this question

Page 15: III. Previous Goals: Update continued

Q43

1. Previous Goal 4:

Respondent skipped this question

Q44

3. Goal Status

Respondent skipped this question

Page 16: III. Previous Goals: Update continued

Q45

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

Respondent skipped this question

Page 17: III. Previous Goals: Update continued

Q46

Link to College Strategic Goal - Which College Strategic Goal does this department goal most directly support? (Check only one)

Respondent skipped this question

Q47

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).

Respondent skipped this question

Q48

What resources, if any, are needed to achieve this goal? Please select all that apply. Links to request forms are included below. All resource requests are due on the program review deadline.

Respondent skipped this question

Page 18: IV. New Goals

Q49

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

No

Page 19: IV. New Goals continued

Q50

1. New Goal 1:

Respondent skipped this question

Q51

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

Respondent skipped this question

Q52

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

Respondent skipped this question

Q53

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

Q54

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

Q55

6. How will this goal be evaluated?

Respondent skipped this question

Q56

What resources, if any, are needed to achieve this goal? Please select all that apply. Links to request forms are included below. All resource requests are due on the program review deadline.

Respondent skipped this question

Q57

Do you have another New Goal?

Respondent skipped this question

Page 20: IV. New Goals continued

Q58

1. New Goal 2:

Respondent skipped this question

Q59

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

Respondent skipped this question

Q60

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

Respondent skipped this question

Q61

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

Q62

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

Q63

6. How will this goal be evaluated?

Respondent skipped this question

Q64

What resources, if any, are needed to achieve this goal? Please select all that apply. Links to request forms are included below. All resource requests are due on the program review deadline.

Respondent skipped this question

Q65

Do you have another New Goal?

Respondent skipped this question

Page 21: IV. New Goals continued

Q66

Respondent skipped this question

1. New Goal 3:

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?

Q72

Respondent skipped this question

WWhat resources, if any, are needed to achieve this goal? Please select all that apply. Links to request forms are included below. All resource requests are due on the program review deadline.

Q73

Respondent skipped this question

Do you have another New Goal?

Page 22: IV. New Goals continued

Q74

1. New Goal 4:

Respondent skipped this question

Q75

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

Respondent skipped this question

Q76

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

Respondent skipped this question

Q77

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

Q78

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

Q79

6. How will this goal be evaluated?

Respondent skipped this question

Q80

What resources, if any, are needed to achieve this goal? Please select all that apply. Links to request forms are included below. All resource requests are due on the program review deadline.

Respondent skipped this question

Page 24: Final Check

Q81

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."

I am ready to submit my program review