#8

COMPLETE

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Page 1: I. Program Overview and Update

Q1

I.1 Department(s) Reviewed:

Chemistry

Q2

1.2 Lead Author

Robert Anness

Q3   **Respondent skipped this question**

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

Q4

I.4 Dean/Manager:

Kim Dudzik

Q5

I.5 Program Update: Please summarize the changes, additions, and achievements that have occurred in your program since the last program review was submitted. To access your 2020 program review, visit the Program Review webpage.

The Chemistry Department has faced multiple intersecting challenges over the past year. The retirement of the most senior member of our department occurred at the exact same time as the campus closure due to the COVID-19 crisis. We were fortunate that she was available to help with the transition of our Chemistry 120 classes (of which she had been the coordinator) to remote teaching. However, we were left for the rest of the semester with only two full-time faculty members (one tenured, and one tenure-track). Given that all of our lab curriculum needed to be adapted to the online environment, there was a big task, and less hands on deck to carry it out. This was all in addition to the more typical hurdles that the majority of our faculty and students faced with regard to lack of access or familiarity with the technology needed for online teaching and learning. As Chair of the department I am lucky to be surrounded with wonderful faculty and staff that worked under incredibly difficult circumstances to make the transition possible. Tenure-track faculty member Robert Dutnall was invaluable in his efforts to convert our general chemistry classes (Chem 141 and Chem 142), and part-time faculty member Rosana Pedroza played the same role for our allied health chemistry class (Chem 102). Other part-time instructors pitched in their ideas for online lab activities as well. Our chemistry staff technicians Violeta Casillas and Elizabeth Hill spent time researching online lab activities to replace our existing labs, and provided our instructors with an enormous number of useful resources. Our Dean's office and the College Administration as a whole had the monumental task of trying to get faculty and students everything they needed, with extremely limited resources, so that instruction could continue. Our department is grateful for all the support that we received in this regard. The quality of instruction that we've been able to maintain since the campus closure would not have been possible without this level of collaboration on multiple fronts.

Another huge casualty of the COVID-19 crisis was the array of student support activities that had been cultivated for years with the support of our HSI-STEM grant (several of these activities are highlighted in Part B of this report). Students were suddenly cutoff from networks of support that relied on access to campus. Moreover, the loss of our senior faculty member to retirement mid-semester was a double blow since she was also a coordinator responsible for the HSI-STEM grant's implementation. By the end of the Spring semester another key member of the grant team retired as well. Fortunately, a new team has since been put together to administer the grant, but these overlapping disruptions to the project have been deeply felt, and the damage will take time to repair.

The Chemistry Department is requesting a new full-time, tenure-track instructor during this Program Review cycle 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 (averaging 51% from Fall 2015 to Spring 2020, 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). Closing equity gaps is one of the key goals of the grant-related work mentioned above. Much of the work is deigned to give students the tools and support they need to get over the hurdles of these introductory STEM courses, and avoid deterring students from pursuing STEM pathways from the outset. Therefore, hiring a new full-time chemistry instructor is imperative for our success in this regard.

Page 2: II. Assessment and Student Achievement

Q6

II.A.1 Is your program following the assessment plan on file with the SLO Coordinator (or Outcome Assessment Committee)?

Yes, the assessment plan is on file and the program is following the plan

Q7

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

Respondent skipped this question

Page 3: II. Assessment and Student Achievement

Q8

You indicated either 1) the department assessment plan is on file, but work is needed to update the plan, or 2) the department has no assessment plan on file and/or the program is not currently following assessment planII.A.1a Please describe how your program is adjusting (or developing) its assessment plan to ensure all courses are assessed within the assessment 4-cycle:

Respondent skipped this question

Page 4: II. Assessment and Student Achievement

Q9

II.A.2 Please provide an analysis of your Student Learning Outcomes (SLOs) findings over the past year and what changes, if any, were made as a result. This may include, for example, changes to departmental practices, program improvements, and/or professional development opportunities over the past year. *If the department did not complete assessments during the COVID-19 public health crisis, please note that here and provide additional context.

The Chemistry department put SLO assessment on hold during the Spring 2020 semester due to the onset of the COVID-19 crisis, and the incredible disruption to our teaching/learning environment that resulted. Our department, like many others that have face-to-face skill training environments, were particularly affected by the move to remote teaching. All of our chemistry courses have a laboratory component, which is impossible to replicate in an online setting. Given this reality, the bulk of our work since the Spring has been focused on trying to provide adequate laboratory replacement activities for our students that can enrich their understanding of laboratory methods, theory, and techniques as much as possible without the hands on training that would normally be at the heart of laboratory instruction. The chemistry faculty are doing our best with the tools we have at our disposal, such as laboratory simulation software (e.g. Labster, BeyondLabz), readings, videos, and laboratory lectures via Zoom. Needless to say, this has been an enormous undertaking to organize and implement.

Any changes that we have made over this past year have been in the service of adapting to the remote teaching environment, rather than as a result of SLO findings. Results of outcomes assessment have prompted our department to make changes in the past (e.g. modifications to presentation and assessment methods, introducing new workshops, etc.), so unfortunately this was a year of missed opportunities on that front. For example, a new type of assessment was used in our Chemistry 142 class during the Fall 2019 semester. The assessment was done during an experiment that required the students to use a variety of analytical techniques such as volumetric pipetting and the preparation of analytical solutions. Rather than use the lab report for this experiment as the assessment tool, the instructor observed the students as they performed these analytical techniques and assessed them based on their proficiency in accordance with a detailed rubric. Though not without its challenges, this type of evaluation provided us with information that could not be fully obtained and address based on a lab report alone. The instructor who developed this assessment tool, Robert Dutnall, was in the process of modifying the assessment process to make it less cumbersome for the instructors, with the plan to implement it again (in updated form) during the Spring 2020 semester. This plan was derailed with the move off campus due to the pandemic.

Our department did resume SLO assessment in the Fall 2020 semester, and at the time of writing the SLO results are still in the process of being compiled and analyzed. 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 are learning 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. 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 the online lab activities previously discussed, 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.

Page 5: II. Assessment and Student Achievement

Q10

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 (67%) over the past five years. Female students tended to have success rates that were slightly higher (69%) than the average success rate in any given semester while male students tended to be slightly lower (65%), but no equity gap is discernible from the data.

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 10% above average) during every semester over the past five years, Hispanic/Latinx students had lower success rates each semester (averaging 17% 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 10% above), African-American students had below average success rates in all but two semesters over the past five years (averaging 30% 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, we hope to be an important piece of the puzzle working to make positive change in this regard. 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 include 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, this past year has been one where our efforts have been largely stifled due to the onset of the pandemic. It should be pretty clear from the various activities listed above how many of them rely on access to our STEM center in the H-Building. This has been a challenging year on so many fronts, but it has been particularly disheartening to see the negative impact that the COVID-19 crisis has had on the amazing STEM ecosystem that we've worked so hard to create. The students that need this network of support the most are likely the ones hardest hit by this pandemic. Faculty have struggled as well, which has in turn limited their ability to put as much time into grant-sponsored activities and mentorship.

Q11

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?

What we are able to do in the next year will largely depend on how the COVID-19 pandemic plays out, and whether or not we are able to resume on campus activities at some point in 2021. We do have a Gear up for Success workshop planned for incoming Chem 120 students prior to the Spring 2021 semester. The workshop focuses on study and organizational skills, as well as problem solving practice that gives students a chance to review the math skills necessary for the class. We also plan to hold regular workshops throughout the semester (via Zoom) lead by faculty for our Chemistry 102 and 120 classes. Chemistry 102 and Chemistry 120 are introductory classes for allied health majors and science majors, respectively, and these courses consistently have the lowest student success and retention rates.

Page 6: II. Assessment and Student Achievement

Q12   **No**

Do you offer distance education (online) courses?
(excluding emergency remote teaching in 2020)?

Page 7: II. Assessment and Student Achievement

Q13   **Respondent skipped this question**

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.

Q14   **Respondent skipped this question**

II.C.2 What mechanisms are in place to ensure regular and effective contact? For resources, see Cuyamaca Guide to Best Practices in Online Teaching

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Page 8: III. Previous Goals: Update

Q15

Goal 1:

Success in STEM Presentations/Workshops/Interventions

Q16   **In Progress - will carry this goal forward into next year**

Goal Status

Page 9: III. Previous Goals: Update continued

Q17

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

Respondent skipped this question

Q18

Do you have another goal to update?

Respondent skipped this question

Page 10: III. Previous Goals: Update continued

Q19

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).

As mentioned in Section II.B.2, the current campus closure will limit what we are able to do this coming year. However, we do have workshops planned for students in our introductory chemistry classes (Chem 102 and Chem 120) prior to and during the Spring 2021 semester. With the help of the campus Institutional Effectiveness, Success and Equity Division, we are collecting data to assess the effectiveness of our student support activities. We will use these results to help shape our STEM presentations, workshops and other interventions. See Goal 2 in this section of the report for more details.

Q20

Do you have another goal to update?

Yes

Page 11: III. Previous Goals: Update continued

Q21

Goal 2:

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

Q22

Goal Status

In Progress - will carry this goal forward into next year

Page 12: III. Previous Goals: Update continued

Q23

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

Respondent skipped this question

Q24

Do you have another goal to update?

Respondent skipped this question

Page 13: III. Previous Goals: Update continued

Q25

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).

Working with the Institute for Evidence-Based Change (IEBC) and the campus Institutional Effectiveness, Success and Equity Division, 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.

Between 2017 and 2019, first-time STEM students who participated in the Title III Grant experienced the highest rates of semester to semester persistence (95%) when compared to first-time STEM students (65%), and first-time, first-generation, low-income STEM students (79%).

Unfortunately, the most recent results with regard to the retention and success rates in STEM courses among our Grant cohort students have not been as promising. Between 2017 and 2019, these students experienced the lowest retention rates (67%) in STEM courses in relation to the comparison groups, with first-time (non-cohort) STEM students experiencing the highest retention rates (87%). Success rates were comparable for most groups (between 62-63%), except for first-time STEM students who did not participate in the Title III Grant, who experienced the highest success rates (69%). These results will need to be analyzed further to better understand them and adapt as necessary. The results provided in the 2019 STEM Cohort Comparison report (which looked at Fall 2018 outcomes) were much more promising, showing first and second-year STEM cohort students with a 91% success rate in STEM courses as compared to 74% for other STEM students (those not participating in the cohort with similar majors). At the time of writing it is difficult to grasp the discrepancy between the results provided last year and those of the most recent report. The chemistry department (and other STEM departments) will need to work with the grant coordinators over the coming year to better understand the situation in order to make improvements.

Q26

Do you have another goal to update?

No

Page 14: III. Previous Goals: Update continued

Q27

Goal 3:

Respondent skipped this question

Q28

Goal Status

Respondent skipped this question

Page 15: III. Previous Goals: Update continued

Q29   **Respondent skipped this question**

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

Q30   **Respondent skipped this question**

Do you have another goal to update?

Page 16: III. Previous Goals: Update continued

Q31   **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).

Q32   **Respondent skipped this question**

Do you have another goal to update?

Page 17: III. Previous Goals: Update continued

Q33   **Respondent skipped this question**

Goal 4:

Q34   **Respondent skipped this question**

Goal Status

Page 18: III. Previous Goals: Update continued

Q35   **Respondent skipped this question**

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

Page 19: III. Previous Goals: Update continued

Q36

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

Page 20: IV. New Goals

Q37

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

No

Page 21: IV. New Goals continued

Q38

New Goal 1:

Respondent skipped this question

Q39

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

Respondent skipped this question

Q40

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

Respondent skipped this question

Q41

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

Respondent skipped this question

Q42

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

Q43

How will this goal be evaluated?

Respondent skipped this question

Q44

Do you have another new goal?

Respondent skipped this question

Page 22: IV. New Goals continued

Q45

New Goal 2:

Respondent skipped this question

Q46

Which College Strategic Goal does this department goal most directly support?

Respondent skipped this question

Q47

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

Respondent skipped this question

Q48

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

Respondent skipped this question

Q49

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

Q50

How will this goal be evaluated?

Respondent skipped this question

Q51

Do you have another new goal?

Respondent skipped this question

Page 23: IV. New Goals continued

Q52

New Goal 3:

Respondent skipped this question

Q53

Which College Strategic Goal does this department goal
most directly support?

Respondent skipped this question

Q54

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

Respondent skipped this question

Q55

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

Respondent skipped this question

Q56

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

How will this goal be evaluated?

Respondent skipped this question

Q58

Do you have another new goal?

Respondent skipped this question

Page 24: IV. New Goals continued

Q59

New Goal 4:

Respondent skipped this question

Q60

Which College Strategic Goal does this department goal
most directly support?

Respondent skipped this question

Q61

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

Respondent skipped this question

Q62

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

Respondent skipped this question

Q63

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

How will this goal be evaluated?

Respondent skipped this question

Page 25: V. Resources Needed to Achieve Goal(s)

Q65

What resources is your program requesting this year to achieve the program's goal(s)?

Faculty Resource Needs

Page 27: Final Check

Q66

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