CUYAMACA COLLEGE

Annual Update Report

Academic - Chemistry (CHEM) - (MS&E)

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. (Goal 1)

Program Goal: 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.
Goal Status: Active

Mapping
2022 - 2028 Strategic Plan: *(X)*

- **Eliminate Equity Gaps in Course Success:** 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. (**X**)
- **Increase Completion and Eliminate Equity Gaps:** 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. (**X**)
- **Increase Equitable Access:** 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. (**X**)
- **Increase Persistence and Eliminate Equity Gaps:** 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. (**X**)

Summary of Progress or Results
Summary Date: 09/19/2024

Summary of Progress or Results

Summary of Progress or Results: Our Department's Chemistry 120 coordinator, Theresa Carlson, was hired as a full-time instructor starting in Fall 2023 and she has implemented a significant course redesign to increase student success, retention and engagement. While this is an ongoing process, great strides have already been made in this regard.

Some aspects of the course redesign include the following:

Curriculum restructuring to include more interactive learning opportunities.

Aligning the lab experiences more closely with the lecture content to enhance students' hands-on understanding of core chemistry concepts.

Weekly learning activities to reinforce lecture material through direct application.

Creation of a dynamic learning environment with the use of discussion boards and lecture participation tools such as QR codes that allow students to answer questions on their phones throughout the class period, increasing participation.

This course restructuring is still new and in progress so the college data doesn't reflect these changes as of yet. However, there are some promising early results as the four Chemistry 120 classes currently running this Fall 2024 semester have the highest retention rates that I've seen this late in the semester (post-withdrawal deadline) during my time at the College.
Reporting Period: 2024 - 2025
Status: In Progress - will carry forward into next year
Action steps for this academic year.:

Action steps for the 2024-2025 academic year:

- Expand upon the interactive learning experiences mentioned above.
- Work toward new lab designs where improvements can be made.
- Strengthen collaborative efforts to enhance equitable teaching practices.
- Establish and promote a Supplemental Instruction (SI) program, or more effectively encourage students to use existing tutoring services and help room hours.
- Work to reduce textbook and homework costs for students.

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.

Summary of Progress or Results

Program Overview and Update

Lead Author
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Collaborator(s)
Theresa Carlson, Robert Dutnall, and Rosana Pedroza

Dean/Manager(s)
Tammi Marshall

Initial Collaboration Date with Dean
11/26/2024

Please summarize the changes, additions, and achievements that have occurred in your program since the last program review.
Course Redesigns:
Given that we are currently focusing on increasing success and retention in our introductory chemistry classes, most of the changes are related to restructuring these courses with that goal in mind. In our accelerated pre-aliied health chemistry course, Chemistry 102, we've adopted a new textbook that provides more practical examples related to the health care field to increase student engagement. We've also increrased the percentage that project-based assessments contribute to the students' overall grade.
The textbook has been changed in our instroductory chemistry class for STEM majors (Chemistry 120) as well, along with a more thorough restructuring of the class. Some changes include an atoms first approach that pushes the math-related content to later in the semester, and a host of new interactive learning activities discussed further in later sections of this report.
Social Events and Collaborations:
The Chemistry Department hosted a Halloween event in 2024 which included fun chemistry demonstrations, a costume contest, and an opportunity for students to meet with their future chemistry instructors.
In addition to the community of practice that our department has been participating in alongside physical science and engineering faculty, we've also joined a community or practice with biology instructors over the past year. These communities provide a space for intructors to share innovative teaching practices with each other and fine-tune student project ideas to increase their efficacy in the classroom.

Assessment and Student Achievement

After looking at the SLO information for the past year in Nuventive Improve, are you are on track for the 4-year assessment cycle?
Yes

Which courses have not been assessed in the last 4 years?
All SLOs in all of our chemistry classes have been assessed in the last four years.

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.
The Chemistry Department worked on updating our PLOs earlier this year, and these changes were submitted to curriculum during the Fall 2024 semester. We are currently working on mapping the PLOs to specific course SLOs. We plan to complete this mapping along with the mapping of PLO's to ILO's at our SLO-focused department meeting during the Spring 2025 Professional Development week.

Student Achievement

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 69% 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 9% above average) over the past five years, Hispanic/Latinx students had lower success rates each semester (averaging 14% 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 9% above), African-American students had below average success rates in all but two semesters over the past five years (averaging 17% below average), representing a significant equity gap.

What action will the department or discipline take to address these equity gaps?

Our preparatory chemistry course for STEM majors, Chemistry 120, has the lowest success rate, averaging 50% from Fall 2019 to Spring 2024, 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. Success rates in all other chemistry courses ranged from 79% to 89% over the same time period.

Given that the lowest success and retention rates are concentrated in our introductory chemistry courses (Chem 102 and 120), most of the focus has been on creating support activities and networks to aid students in these classes. These include workshops, STEM-centered counseling and tutoring servises, and a STEM ACP Canvas shell to promote events, workshops, research opportunities. internships, etc. However, not all of our students take advantage of these resources so they likely have only a limited effect on success and retention rates. These supports *outside the classroom* are important and we will continue to provide and promote them, but we are currently putting the most focus on restucturing our Chem 120 and 102 classes to increase engagement *inside the classroom*.

Chem 102 is an accelerated class that serves to fulfill the chemistry requirement for Allied Health majors in one semester. Our Chemistry 102 coordinator, Rosana Pedroza, has recently switched to a new textbook that provides more practical examples relating the material to the health care field. Since most of these students aspire to work in health related fields, this change can help increase engagement with the course material. In addition, the coordinator has worked to shift a portion of the overall grade percentage in this class toward project-based learning. This not only takes some of the weight off in-person exams as the main assessment tool, but also allows students to choose topics they find interesting for their projetcs, giving them some agency in their education.

In line with our Program Goal, Chemistry 120 is undergoing an even more significant redesign to increase success and retention rates. Some of the changes include more interactive learning activities, aligning the lab experiences more closely with lecture content to enhance students' hands-on understanding of core chemistry concepts, and weekly learning activities that reinforce lecture material through direct application to improve comprehension and retention. This course restructuring is being led by Theresa Carlson, our newest full-time faculty member and Chemistry 120 coordinator.

Please describe any enrollment changes (increases/decreases) over the past year and the context for these changes.

Enrollment in our chemistry courses has increased by 10% from Fall 2022 to Fall 2023, and 5% from Spring 2023 to Spring 2024. This is part of a general trend in enrollment growth starting in Fall 2022. Chemistry enrollment dropped significantly from our peak in Spring 2020 due to the onset of the COVID-19 pandemic, reflecting national trends. Moreover, departments throughout our district were asked to cut sections early on during the pandemic due to economic uncertainty. Enrollment has started to climb back up in recent semesters as we've been able to add back class sections.

Annual Update

What has this data revealed about the progress of the program review goals you set?
Our Program Goal is focused on increasing success and retention rates in Chemistry 120 though data exploration, implementation of course improvements and promotion of student support networks and activities. Most recently we have focused on the course redesign mentioned in a recent section. This course restructuring to increase student engagement has only been implemented over the last couple of semesters so the data doesn't reflect these changes as of yet. However, there are some promising early results as the four Chemistry 120 classes currently running this Fall 2024 semester have the highest retention rates that we've seen this late in the semester (post-withdrawal deadline) during my time at the College. This is a remarkable achievement and we look forward to seeing how the college data shakes out over the next several semesters since the implementation of these changes.

Distance Education Course Success (If Applicable)

Program Goals

Program Goals Status
I have updated the progress on my previous goals.

Program Goals Mapping
Mapping for all active Program Goals complete.

Submission

Program Review response is complete and ready for review.
Yes - Response complete and ready for review