

2022-23 Program Review Template

Directions for Lead Writers: Please use this template to complete your Unit’s Program Review for this cycle. Instructions for submitting your completed template at the end of the spring semester will be provided in a few weeks. Click [here](#) to view our Glossary of Terms.

Other Resources:

[Program Review Handbook](#)

[Acronym Dictionary](#)

[Resource Link Library](#)

[Mesa 2030](#)

[Program Review Archives](#)

DEI Discussions: as part of your reflection with your unit, a workgroup has developed a Diversity, Equity, Inclusion, and Accessibility Discussion Guide. Please use this in your unit-level discussions as we move toward becoming more diverse, equitable, inclusive, and accessible through intentional and ongoing campus-wide reflections and revisions of policies and practices.

View the guide [here](#). Have reflections or feedback to share? Click [here](#).

<i>Program Information & Executive Summary</i>		
Prompt	Guidance	Program Response
Describe the successes and challenges your unit has faced since the last comprehensive review.		<p>Chemistry is considered to be the central science because physics, engineering, biology, and allied health majors, and many other majors require courses in chemistry. Because of this, the Chemistry Department offers many courses ranging from preparatory chemistry, general chemistry, organic chemistry, analytical chemistry, allied health prerequisites, and a general education course with an emphasis in environmental issues.</p> <p>Currently, there are 9 full time faculty members and 19 adjuncts. Adjunct FTEF is 9.80 for Spring 2023 which is 52% of our total FTEF. (Note: F22 values in Table 2 are corrected since the FHP Data dashboard was double counting sections of a faculty member who was on leave). Fall 2022 Spring 2023 FTES/FTEF 14.02 14.74 Adjunct FTEF 8.80 9.80 Total FTEF 17.37 18.87 % of FTEF Adjunct 51% 52% Fill Rate 93% 96% Two full time faculty members are no longer teaching with us since Fall 2021. There are four Instructional Laboratory Technicians.</p>

		<p>The Chemistry Department creates a supportive learning environment that spans across our curriculum. We constantly assess our student success across courses that form a sequence (e.g. Majors Preparation Track 152->200->201 or Allied Health Track 100->130->160). Our department works hard to establish a set core of standards so that students can succeed as they move through our courses. Laboratory courses provide an equitable way to present hands-on learning that supports lecture material. Laboratory work also provides a venue for students to work collaboratively and make STEM relationships that can support them through their courses. The Chemistry department prides itself on having student centered teaching and providing high quality equitable instruction grounded in standards for scientific work that will allow students to be successful at four year schools. The hallmark skills that our department fosters are critical thinking and hands-on experiential learning . Our professors use lecture presentations, small group discussions, worksheets, application to the real world, and hands-on laboratory training to help students understand and learn what is considered to be a very difficult and intimidating subject. Critical also is our interaction with students via office hours, review sessions, support courses such as Chem 16 and Chem 20, and Canvas.</p> <p>The Chemistry Department is committed to preparing students for transfer to four year schools and providing a foundation in future work in science or professional schools. There were 3 Associate Degrees in Chemistry and 4 degrees in Liberal Arts and Sciences Science Studies-Chemistry conferred during Fall '21- Sp '22. 57% of the students were 18-24 in age, 71% were female. 57% were Asian American.</p> <p>Our departmental goal is to create spaces to greet students in the most positive way and to help them reach their potential as STEM students. San Diego is a STEM hub and has two of the most highly ranked schools for STEM in the State: UCSD and SDSU as our transfer institution. We take pride in preparing students for transfer and honing in on their analytical and critical thinking abilities. This is a process for students as they make their way through our courses to achieve their dreams of becoming scientists, engineering, pharmacists, doctors, nurses, physical therapists, and environmental scientists. Chemistry does not have many students majoring in chemistry (see previous paragraph). However, we are a highly enrolled program due to our role in supporting Biology (both Biology Majors and Allied Health Majors) and Engineering Majors. Our Department has worked together as a team and is proud of the work they have achieved to reduce barriers to student success. We have pivoted in so many ways and always worked as a team to provide quality learning for our students. These transitions required constant re-writing and adjusting of course materials and countless hours of work from our faculty. Many transitions occurred over the last three years including face-to-face, to online even in lab, to returning during the pandemic for limited labs, to full return Fall 2021, and then pivoting to first three week remote and then back to campus Spring 2022. Fall 2022-Spring 2023 feels a lot more “normal” and natural. The goal of the</p>
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		<p>Chemistry Department has been to provide equitable quality education in a student centered and positive learning environment.</p> <p>The philosophy of the department is to be student centered and equitable while upholding standards of excellence in scientific and critical thinking. Standards are important to our department while providing an engaging, supportive, and positive learning environment. This is achieved by communicating clear expectations to students, student centered pedagogy, equitable teaching practices, open door attitude to students, updating and improving laboratory courses, support courses, participation in embedded tutoring programs and Peer Mentoring, close relationship to counseling, and a focus on equity. Participation in and leading Professional Development training and opportunities in the college is also an important practice in the Chemistry Department. Many faculty within the department are actively involved in leadership positions on campus to participate in shared governance.</p>
<p>If applicable, describe any major curricular or service changes your unit has engaged in and the impact of those changes since the last comprehensive review.</p>	<p>Optional</p>	<p>Refer to Goal 2 in Goals Section.</p>
<p>If applicable, describe the impact of any new resources (human, fiscal, etc.) on the unit and/or action plan implementation.</p>	<p>Optional</p>	<p><u>Need for New Faculty</u></p> <p>The goal of the Chemistry Department has been to provide equitable quality education in a student centered and positive learning environment. To this end, the Department has taken leadership roles and participated in many events and programs to help students feel welcomed and supported. We have pivoted in so many ways and always worked as a team to provide quality learning for our students. These transitions required constant re-writing and adjusting of course materials and countless hours of work from our faculty. Many transitions occurred over the last three years including transitions to online teaching, including hard to convert laboratory classes, to returning during the pandemic for limited labs, to full return Fall 2021, and then pivoting to first three week remote and then back to campus Spring 2022. Fall 2022-Spring 2023 feels a lot more “normal” and natural.</p>

		<p>It is our belief that our department needs two additional full time faculty members to join our team of educators. We need an equity minded General Chemistry instructor with a strong analytical and thermodynamics background that leans towards physics/engineering. This is for reasons that will be explained in this narrative. In addition, we would like a faculty member that has an interest in forming partnerships with outside institutions and bringing research collaborations with four-year colleges and universities. The Chairs and Senior faculty of the Chemistry Department are excellent new faculty mentors. We assign each new faculty a mentor who works with them throughout their tenure process. Additionally, the department works to maintain a supportive, nurturing space for all department faculty. This has led to two of our tenure track faculty recently being recommended for tenure, and our most recent faculty hire being quickly integrated into the department activities and comradery. This requires regular meetings, as well as constant office/hallway discussion of everything from activity organization, to teaching techniques, to course content and pacing. It is a constant and regular part of our days for new, as well as senior faculty. It is what makes our department run so well and how we can easily integrate two new contract faculty members into the mix. We are requesting two more full-time faculty members and our data shows that we can justify this request. One of our full-time faculty members will be retiring by Dec. 2023. Two more by Spring 2024.</p> <p>Dr. Alexander officially retired as of Spring 2022 and he was an active member in equity efforts with the nationally acclaimed Bridges to the Baccalaureate Program that was a research program focused on opening research opportunities for underrepresented students in STEM. This was an award-winning program that successfully transitioned Mesa students to UC colleges and helped to inspire many of our students as Ph.D. candidates in STEM. His absence has left a vacancy with regards to research specifically supporting underrepresented groups in chemistry that would be filled with the new hires. The new faculty could be intentional in recruiting African American students and Latinx students to become researchers and continuing their studies towards a Ph.D. as the Bridges Programs previously supported.</p> <p>Justification for Analytical Chemistry Faculty Hire: This hire will teach Chem 251, Analytical Chemistry as well as courses in the General Chemistry sequence of Chem 152, 200 and 201.</p> <p>1. Chem 251 has not been offered since Spring 2020 due to staffing shortages. It had regularly filled to 100%.</p>
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		<p>2. This course is all about instrumentation that requires a specialized expertise that includes up to date technical knowledge. Currently, there is only one full time faculty member with this expertise, but they do not have room in their schedule for this course.</p> <p>3. The load for this course is 0.6 FTEF per section AND it requires that the instructor be heavily involved in preparing for the lab portion. That 0.6 is currently not in our schedule, so this part of the new contract instructor's load would be additional FTEF. The instrumentation requires specialized care and attention. It is enormously time consuming, even with help from our amazing ILTs. It has not been possible to find an adjunct instructor with time and expertise for this course. We have tried to recruit Analytical Chemists from industry to no avail. Our pay for adjuncts is not competitive to industry standards.</p> <p>4. This course is very important because it is a Preparation for Major course for Chemistry majors to CSU. Sadly, our chemistry majors have had to go to City College to complete this course recently. It also serves students as a prerequisite to Clinical Laboratory Sciences at SDSU. It is clear from our data provided above that our departmental enrollment, productivity, and adjunct percentages support the hiring of two full time faculty positions. With an adjunct FTEF of 9.80 and climbing, along with a fill rate of 96%, we will welcome two full time faculty.</p> <p>We are very appreciative of our adjuncts, but are also aware of what an impact new full time professors can have on student success and enrollment. Our General Chemistry track, in particular, Chem 152 and Chem 200 were most impacted by online learning, AB 705, and the pandemic. The equity data shows a significant and anomalous drop in success rates during Spring 2022 due to being online for the first three weeks. These courses are considered gateway courses to STEM because they are required for other majors such as Biology and Engineering. Our department has worked tirelessly to help students through the supportive student-facing interventions described in the excellence section below. This includes participation in Path to Stem Success, HSI E-3 Grant projects, STEM Success Days, and Peer Mentoring/Faculty Workshops. We need two full-time faculty. One will focus exclusively on the General Chemistry and the other one on</p> <p>Analytical/General Chemistry since these courses have suffered the most pandemic effects. This request focuses on the Analytical/General Chemistry position. Analytical Chemistry is a critical course to prepare our chemistry students for jobs in industry. Once they complete this course, it would allow them to apply to jobs in a chemistry laboratory. Ms. Danica Moore has become our new representative as the Work Based Learning Faculty Liaison for STEM. This new hire could work with her to form partnerships with industry to find good jobs for our students in particular for our underrepresented groups.</p>
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		<p>We would also like to obtain funding to offer workshops using some of the instrumentation taught in Analytical Chem. This would target those students whose major does not require this course but who would benefit from the job skills learning these techniques provides. This Full Time Faculty member can be actively involved in forming new partnerships with four-year schools to form a research partnership for underrepresented groups in STEM to replace the Bridges to the Baccalaureate Program. This hire could be intentional in recruiting African American students into STEM. Analytical Chemistry is also a requirement for students going into Clinical Laboratory Sciences. This in demand career path to well-paying jobs is important to keep open for students in underrepresented groups. We need a full-time tenure track faculty to focus exclusively on reviving our Analytical Chemistry course with a focus on equity since this course has been affected by the pandemic.</p>
Please confirm that the department has reviewed the Course Learning Outcomes listed in CurricuNet for each course and verify accuracy.	Select One	<input checked="" type="checkbox"/> Reviewed and accurate <input type="checkbox"/> Reviewed not accurate, update in progress <input type="checkbox"/> Reviewed not accurate, need support
Data Reflection		
Prompt	Guidance	Program Response
Describe the trends you see in your program/service area's data.	Instructional Data you may consider: enrollment trends, course & program learning outcomes, Institutional Learning Outcomes, course success and retention rates, degree completion, transfer, employment, labor market analysis, other data relevant to your unit's work	<p><u>Analysis of Enrollment Trends</u></p> <p>The Data dashboards used for this data is Mesa College Course Outcomes Dashboards</p> <p>The enrollments have changed over time (Table 1). Since last Program Review focused on pandemic teaching and trend, the goal of this Program Review will be to discuss changes to enrollment and success rates pre-pandemic face to face average of Sp '18, Fall '18, Sp '19, and Fall '19 compared to face to face Fall '21 and Spring '22. Fall 2022 and Spring 2023 are included with</p>

Service/Admin Area Data you may consider - service usage, service access, demand for services, student service/administrative unit outcomes, types of services offered and used, headcount of services usage, trends in reason for service use, other data relevant to your unit's work

enrollments and not with success rates since that data is not available. This report will exclude semesters that were discussed in last year's Program Review.

TABLE 1-ENROLLMENT BY SEMESTER		
Semester	Enrollment	
Spring 2018	2658	On campus
Fall 2018	2786	On campus
Spring 2019	2859	On campus
Fall 2019	2680	On campus
Spring 2020	2773	On campus/ remote flip
Fall 2020	2625	Remote except a few selected labs
Spring 2021	2613	Remote except a few selected labs
Fall 2021	1924	On campus
Spring 2022	1762	On campus- First three weeks remote
Fall 2022	1979	On campus
Spring 2023	2165	On campus

Enrollment has dropped which is consistent with a local, State, and National trend in community college enrollment. For example, there has been approximately a 30% enrollment drop from Fall '18 to Fall '21. (Table 1) There are many factors out of our control affecting enrollment. Low

unemployment, changing demographics, record numbers of students accepted to UC and CSU, pandemic related financial strain, and direct COVID-19 impact on students and their families are most likely contributing factors. Because chemistry believes in managing enrollment, fill rates are still among the highest at the college. Despite the drop in enrollment, the department has been running with high efficiency with only a small number of course cancellations and disruptions for students and faculty. This is due to the scheduling expertise of our Dept Chair Dr. Budzynski.

The trend is reversing and our enrollments are rising. This Spring 2023 has 2165 enrollments across 73 sections compared to Spring 2022 with 1762 enrollments. 71 of those sections are held completely on campus, and two are hybrids that meet 50% on campus. We saw a significant drop in enrollment in F21/S22 when we brought the majority of our classes back to campus. We have seen a consistent increase since then. Spring 2023 Spring 2022 2165 1762 FTES/FTEF is equal to 14.74. Our department prides itself on excellence in managing enrollment. Our fill rates exceeded 93+ over the last year. This Spring 2023, our department is at a 96% fill rate.

The trends in Success Rates Disaggregated by Ethnicity in Chemistry are listed in Table 2. Note that the percentage of students enrolled in our course

TABLE 2: Comparison of Success Rates Disaggregated by Ethnicity for Chemistry

Semester	College Success Rates	Chem Overall Success Rates	Latinx	White	Asian	Black/African American
Spring 18	74%	78%	72%	83%	86%	59%
Fall 18	73%	78%	75%	79%	86%	70%
Sp 19	74%	75%	70%	81%	83%	62%
Fall 19	74%	76%	74%	80%	80%	63%
Fall 21	73%	75%	70%	81%	83%	61%
		Enrollments: 1924	%enrollments=36%	%enrollments=27	%enrollments=11	%enrollments= 3.2

Sp 22	76%	73% Enrollments: 1762	63% Enrollments=36%	79% Enrollments=26%	82% Enrollments=11%	69% Enrollments= 2.0%
Fall 22	75%	76% Enrollments: 1979	69% Enrollments=38	83% Enrollments=25	84% Enrollments=11%	59% Enrollments=4.0%

Overall trends in Data Table 2

-Overall chemistry success rates match or exceed college success rates. The only exception is Spring 2022. The department feels that this was due to being online for 3 weeks and then returning to campus. This was a major disruption for students.

-White and Asian students exceed the overall chemistry success rates in all the semesters shown in Table 2. The percentage of White (~25%) and Asian (11%) students is fairly consistent among all the semesters.

-Latinx students represent a consistent percentage (~37%) of our students. This is similar to the campus representation of Latinx students (~37%).

-Latinx student success rates tend to be fairly consistent between semesters, but lower than the average overall success rates. There is an equity gap. This gap and interventions will be discussed further in the next section.

-Latinx students' success rates were lowered during Spring 2022. There was a disproportionate impact on Latinx students most likely due to the three weeks remote that lowered our overall success rates.

-Black/African American students represent a very small percentage of our total student demographic. The percentage (~3% average) is lower than the campus representation (6%). This underrepresentation of Black/African American students will be discussed further in the next section.

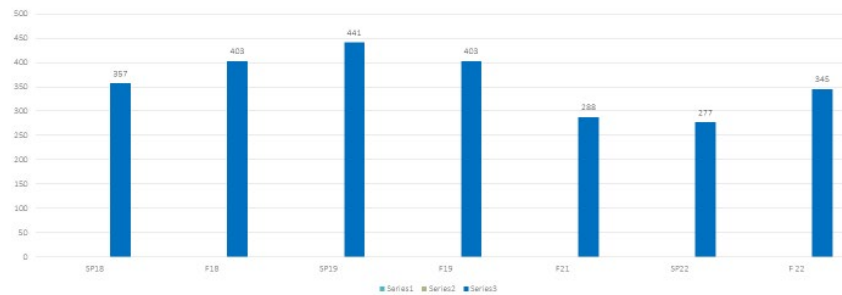
-Black/African American student success rates in chemistry tend to fluctuate and are lower than the average success rates. The small number of Black/African American students in

		<p>our classes makes it difficult to discuss trends. Fluctuations in drops will significantly affect the overall success rates.</p>
<p>Describe any equity gaps you see in these data. Are there differences and/or patterns observed by demographics (e.g. race/ethnicity, gender, age, etc.)?</p>	<p>Equity gaps refer to disparities in educational outcomes and student success metrics across race/ethnicity, socioeconomic status, gender, and other demographic traits and intersectionalities.</p>	<p><u>Student Success Rates at Course Level</u></p> <p>Mesa College Data Dashboard for the department overall shows a similar success rate to the overall campus success rates taking into account data from face to face semesters F21-Sp 22 (73%). This includes the courses Chem 100, 103, 130, 160 (Allied Health and Nutrition track), General Chemistry (152, 200, 201 track), and Organic Chemistry (231, 233). An equity gap exists with Latinx students having an overall success rate of 66%.</p> <p>Equity gaps are most prevalent in two of the three General Chemistry classes (Chem 152, 200) and Organic Chemistry (Chem 231). The General Chemistry courses consistently reflect the percentage of Latinx students at the college which is ~37%, the data that will be discussed is a comparison of Latinx and white student success rates. Please note that Asian success rates match or slightly exceed white student success rates (Table 2).</p> <p>At the course level, discussions of Black/African American success rates become difficult due to the small numbers of students. In most classes after Chemistry 200, the numbers do not allow for the statistics to be recorded on the dashboards. Small changes in enrollments lead to large changes to success rates due to small numbers of students.</p> <p><i>Note: This discussion will focus on Comparing Fall 21 and Spring 22 to previous on campus semesters (Sp 18, F 18, Sp 19, and F19).</i></p> <p><u>Success Rates in General Chemistry</u></p> <p>General Chemistry is defined as the pathway of courses of Chemistry 152→200→ 201 that is part of the curriculum for most science majors: Biology, Chemistry, and Engineering (some programs only require Chem 200).</p> <p><i>Chemistry 152: Preparation for General Chemistry</i></p> <p>Graph 1 shows enrollment trends for Chemistry 152 and there has been a substantial decline in enrollment consistent with overall enrollment declines. One barrier to enrollment that has been identified. The prerequisite to Chem 152 is Math 96 or M50. The system</p>

does not allow a student in Math 116 to register for Chemistry 152 until they have completed the course. This does not make sense since Math 116 is a higher level course than Math 96. The issue is being addressed in two ways. Chairs met with District Instructional Services and they are working on fixing this in the system. Second, the Chairs met with sister colleges Dean and Chairs to discuss the prerequisites. Based on student success data by math courses provided by IE Office, Math 116 and Math 104 could also be prerequisites. However, Miramar and City felt comfortable including these courses as advisories to be activated in Fall 2025.

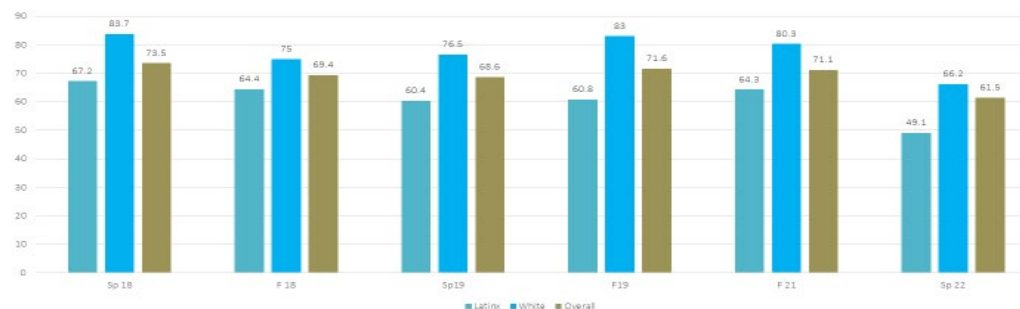
Graph 1

Enrollment Trends for Chemistry 152- In Person Semesters



Graph 2

A Comparison of Latinx vs White Students Chemistry 152 Success Rates
In Person Semesters



Graph 2 shows an equity gap for Latinx students of -7% for Fall '21 that is consistent with pre-pandemic equity gaps.

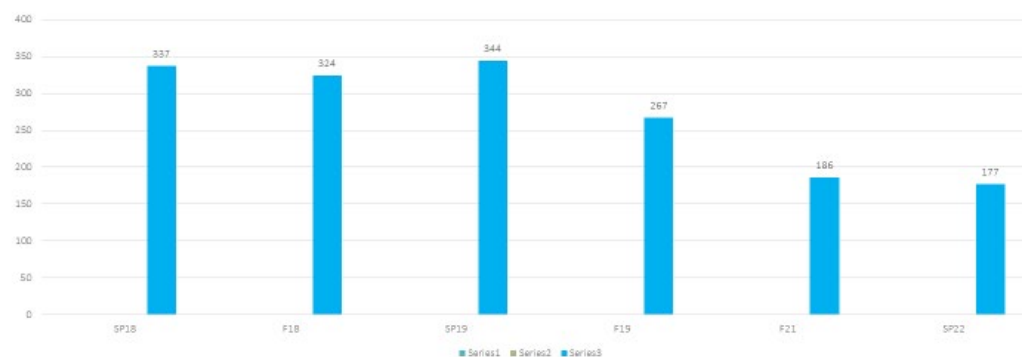
Spring 22 shows an *anomalous* data trend with an equity gap of -17%. The overall success rate of 61% compared to the other semesters where the success rates were closer to 70%. In addition, there was a substantial equity gap with Latinx students having a success rate of 49.1% which is much lower than the other semester shown (60-67% range).

All Hands on Deck! This data was noticed by the Chair and the Program Review Liaison called a meeting to discuss the data in August '22 with all the full time faculty in attendance. The main consensus was that the source of this anomaly was that this semester started remotely for three weeks due to the Omicron wave. Faculty discussed how this completely changed the dynamics of the class as the first three weeks tend to focus on unit conversions which are foundations to the rest of the course. This remote period is most likely the cause of this unusually low success rate data.

There is also the major effect of AB 705. The prerequisite for Chemistry 152 is Math 96 or M50. However, due to AB 705, most students are clearing the M50 level and can register for Chem 152 without actually being prepared with the algebra skills needed for the course. From data provided by IE, many students are taking Math 116, 104, or 119 concurrently with Chemistry 152. However, students may not have the algebra skills. Students can clear

		<p>M50 with three years of high school math (IM 1, 2, and 3). It also means that a student can potentially take Chemistry 152 without having had math in high school senior year. Many students enrolling at Mesa are not coming directly from high school. So, recency of math is undoubtedly an issue. Many may clear M50 without having any recent recollection of algebra.</p> <p>In addition, students in Fall 2021 and Spring 2022 would have been in online coursework in high school. There have been many articles published regarding the negative impact online learning had on skills in math. https://www.nasbe.org/the-impact-of-covid-19-on-math-achievement/</p> <p>This is an effect that may be a factor in our Fall '21 and Sp '22 academic year.</p> <p>Since this decline in success rates was noted early enough, the department mobilized by requesting funds to offer Faculty Led Workshops. This successful project was led by Dr. Sardo and Dr. Gustin. A summary of interventions will be discussed in a later section.</p> <p><i>Chemistry 200 General Chemistry I</i></p> <p>Enrollment trends are similar to overall enrollment trends.</p> <p>Graph 3</p>
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Enrollment Trends for Chemistry 200- In Person Semesters



Success Rate data disaggregated for Latinx and White students for Chemistry 200 shows a similar trend to the Chemistry 152. Fall 21 shows a similar trend to pre-pandemic semesters. The overall success rate is a range of (81.9 to 69.8), but Spring '22 success rate is much lower at 58.5%. The equity gaps between Latinx students and White students varies from each semester. However, Fall '21 and Sp '22 show wider gaps with Sp '22 being extremely wide. (Graph 4).

There are many possibilities to this decrease. One is that we are still having students enter into Chemistry 200 that may have had full online Chemistry 152 in addition to online Math prerequisites. Because chemistry is a highly quantitative subject, online where notes are easily accessed may not adequately prepare students for courses in a sequence. This may be affecting student success. In addition, the three week remote seems to have affected the students ability to transition into college level chemistry. Chemistry 200 traditionally is a difficult transition for students. Lastly, there were some new faculty in that class that could have affected the students' success. The latter has been addressed. Faculty Led Workshops in Chemistry 200 were well attended. Chemistry 200 also participates in the Peer Mentor Program. Our Chemistry 200 team is hopeful that these semesters are a

transition from online to face to face and that the next Program Review will describe them as an anomaly. We will continue to provide interventions that will help students to be more successful in our courses.

Graph 4

A Comparison of Latinx vs White Students Chemistry 200 Success Rates In Person Semesters

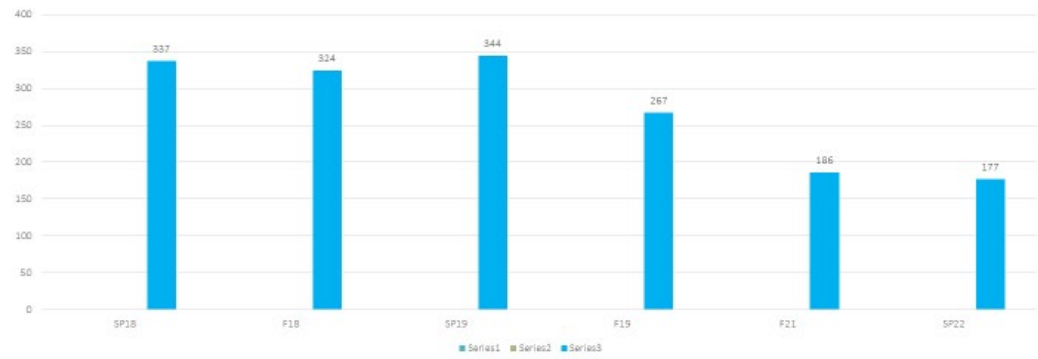


Chemistry 201: General Chemistry II

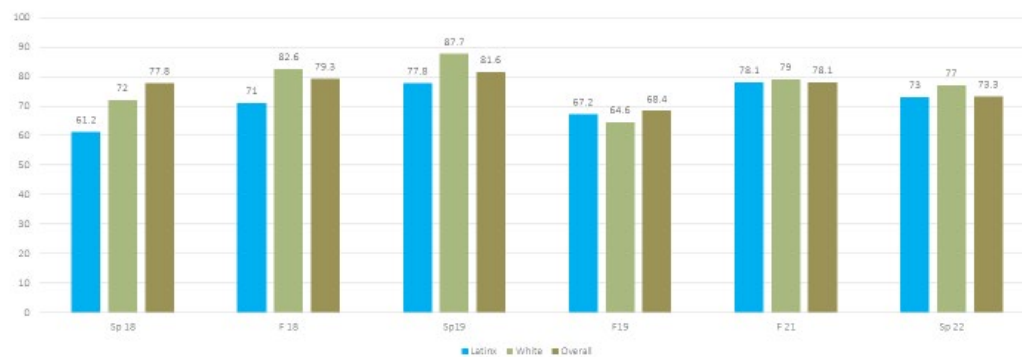
The enrollment trend is consistent with the rest of the program (Graph 5).

Graph 5

Enrollment Trends for Chemistry 201- In Person Semesters



A Comparison of Latinx vs White Students Chemistry 201 Success Rates In Person Semesters



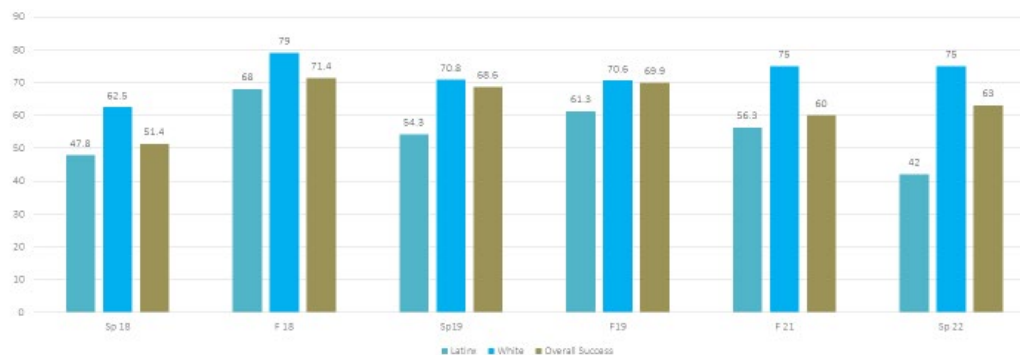
Graph 6

The data from Chemistry 201 shows no/less equity gaps (Graph 6). In Fall '21 there were no equity gaps between White and Latinx students which is great news. In Spring '22, the equity gap was 4% but Latinx students' success rate was the same as the overall average. The data also shows that F '21 and Sp '22 had higher overall success rates than F '19. The overall success is slightly lower than Sp '18, F '18, and Sp '19, but the equity gaps are significantly better. Students appear to improve in this third semester class perhaps due to maturity in their learning journey and an understanding of the work that is required to be successful for chemistry courses. Chemistry 200 instructors work hard to prepare students for further work in chemistry and biology. In addition, students would have been entering into Chem 201 face to face from a Chem 200 that was also face to face.

Organic Chemistry-Chemistry 231 and 231L

Organic Chemistry is a course that is taken by most biology and all chemistry majors. Our program is smaller than General Chemistry. (Graph 7) Representation in Chem 231 is ~35% for our Latinx students. An equity gap does exist for Latinx students in Chem 231.

A Comparison of Latinx vs White Students Chemistry 231 Success Rates In Person Semesters



Chemistry 233

In Spring 2022, the success rates for Chem 233 was 65% for 17 enrollments. The data for Fall 2021 is not showing low enrollment (less than 10) or not offered.

Organic chemistry faculty have been working hard to support students. Additional office hours, Faculty Led workshops, and recruiting and supporting students to work in the Peer Mentoring program and also in the Tutoring Center are the ways that faculty have been helping students.. Organic chemistry faculty are working closely with these students to help support them.

Success Rates in Allied Health Track

The following Table 7 shows a comparison of the Allied Health Courses:

TABLE 7: Allied Health Track Courses Success Rates

Course	Sp 18	F 18	Sp 19	F 19	F 21	Sp 22
Chem 100	66%	61%	63%	72%	64%	79%
Chem 103	x	x	x	70%	63%	90%
Chem 130	70	70	73	86%	63%	71%
Chem 160	92	88	90	90	x	96

There is not enough data to disaggregate on ethnicity in these courses. Fall 2021 was an anomaly in the Allied Health track due some last minute personnel changes and unfavorable modalities-online synchronous. There were multiple online synchronous courses that had to be switched to other faculty at the last minute.

Our Allied Health courses have benefited greatly from newly full time instructors being involved in curriculum development and lab redesign for our Chemistry 100, 100L, 130, 130L, and 103.

General Education Course-Chem 111

This course has a high success rate of Fall 2021 (80%) and Spring 22 (83%) which is consistent with an average success rate of 83% in Sp 18,F18,Sp 19, F19. This course is a great course to promote sustainability. Please see the *Sustainability* section of this document.

Analytical Chemistry-Chem 251

This course has not been offered despite being a Preparation for Major course at CSU for chemistry majors. Please see *Need for Faculty* section of this document for further important discussion.

Laboratory Courses

The success rates in laboratory courses in Fall 2021 and Spring 2022 are overall consistent with the previous pre-pandemic on campus labs (Table 8). The only anomaly was Fall 2021 Chem 130L. This was due to a personnel issue for that semester and has been addressed.

Table 8: Success Rates in Laboratory Courses

	F 21	Sp 22	F19, Sp19, F18, Sp18 Average
100L	70	86	78
111L	74	93	92
152 L	77	75	80
200L	83	75	83
201L	86	77	87
130L	48	71	80
231L	85	89	89
233L	x	84	93

<p>Describe the discussion(s) that took place about the unit's learning outcomes assessment data.</p>	<p>Department Outcomes Coordinators (DOCs) facilitate a department wide discussion on learning outcomes data each year during "Outcomes Across Campus". DOC's may be helpful in supporting this section.</p>	<p>Course Outcomes Assessment Data:</p> <p>This was discussed at CLO Department Meetings and Department Meetings in Spring 2022, Fall 2021, and Spring 2023. Planning for next year has started. Most likely we will continue similar evaluations for our courses and programs as was done in previous years. This includes:</p> <ul style="list-style-type: none"> -Measurements and Chemical Calculations -Atoms and Compounds -Structure and Properties -Chemical Reactions -Nomenclature <p>Program Outcomes focus on the following areas: Note: Program is defined as General Chemistry (152-200-201)</p> <p>Critical Thinking Communication Personal Responsibility</p> <ul style="list-style-type: none"> <input type="checkbox"/> For the lecture courses: <ul style="list-style-type: none"> ✓ Questions were given to students as part of an exam. ✓ Results were collected and evaluated to see if the benchmark was met. <input type="checkbox"/> For the lab courses <ul style="list-style-type: none"> ✓ Grade the materials, safety, and procedures of one experiment for each course. ✓ Results were collected, evaluated to see if the benchmark was met. <p>For the lecture courses: 70% of correct answers For the lab courses: 70% of correct answers</p> <p>For the lecture courses Benchmark met. Chem 152 (71.4%) , Chem 200 (74.1%), Chem 201 (80%)</p> <p>For the lab courses Benchmark met. Chem 152L (85%) , Chem 200L (86%), Chem 201L (84%)</p>
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		Target met and exceeded for all the courses.
<i>Practice Reflection</i>		
Prompt	Guidance	Program Response
Describe current practices your unit has engaged in that you believe impact the above data trends and equity gaps.	Items to consider: new actions specifically focused on issues of equity, major curricular changes, professional learning, policy or process changes, data-informed unit dialogue, community outreach.	<p><u>Program Involvement & Best Practices</u></p> <p>This academic year of Fall 2022-Spring 2023 and in light of the “post” pandemic learning and teaching obstacles, the Department has put all its efforts to provide as much support as possible to students in numerous ways. Our department is extremely active in participatory governance, campus wide committees, and the HSI Equity, Excellence, and Exito (E-3) Grant. We support high quality and culturally relevant curriculum as part of every day teaching. Many of our contract faculty members support Honors Contracts that allow students to make relevant connections to important research. The Curriculum Work Group HSI E-3 Grant has shown that we need a full-time equity minded educator with an expertise in teaching general chemistry geared towards engineering and physics. Four Chemistry full time faculty have taken initiative in participating in the HSI Excellence, Equity, and Exito since Fall 2021. This is interdisciplinary work focusing on the elimination of barriers and to provide support for students entering Mesa College. We are collaborating heavily with the faculty from physics, math, engineering, and biology. This has led to many projects that will require a faculty lead to institutionalize a significant overhaul of General Chemistry.</p> <p>There are three major projects that require additional full-time contract faculty. One is the Chemistry 200 Acceleration that will eliminate barriers to General Chemistry and supports timely completion of educational goals. This project focuses on improving instructional effectiveness with a gateway STEM course. This is a data driven project that shows success in general chemistry if the student has completed pre-calculus (Math 121+). This change will require curriculum changes, discussion at District level, and support course curriculum. It has the potential to save many students 3.5 units. There is a contract faculty member leading these efforts who is also department chair, but this is a many year long process that needs a dedicated full time general chemistry professor. It is a goal for the department to analyze the data from this project next Program Review Cycle.</p> <p>The other project is the changing of curriculum to adjust for AB 705/1705. Chemistry requires specific math skills upon entering our General Chemistry or Allied Health</p>

		<p>pathways. Because of changes in math prerequisites, our department will have to adjust curriculum and work tightly with the math department to continue to provide quality chemistry education. This will require additional full time faculty members in our department. Department Chairs are working with Math Chairs and Dean to understand more fully what the legislation is requiring and the impact it will have on STEM majors. This conversation is occurring through chemistry departments' heavy involvement in the HSI Curriculum Work Group through the E-3 HSI Grant.</p> <p>The department is heavily involved in creating spaces and internal sense of community for STEM students and this all requires additional faculty. Highlighted below is a sampling of our department's commitment to equity and excellence.</p> <p>*STEM Success Days Lead: Ms. Moore Interdisciplinary celebration of students. Two day event that brought in games, food, four year colleges, and "Wall of Fame". UCSD and SDSU representatives attend.</p> <p>*Peer Mentoring Lead: Dr. Chang Fall '19-present Chemistry has been actively involved in the Peer Mentoring Program. We have had two Peer Mentors over the last year. We continue to encourage students in General Chemistry to attend.</p> <p>*Participation in Classroom Tutoring Program: Chemistry 100 instructors (Ms. Moore, Mr. Fremland, & Dr. Gustin) participated in mentoring classroom tutors. This is a great way of providing more support for students.</p> <p>*Path to STEM Success: Dr. Fusco Hernandez In Summer 2022, this was a four day event welcoming students to STEM at Mesa College. In Intercession 2023, this was a two event with 40 participants. It has received much positive feedback and campus accolades. This program continues to grow under her leadership.</p> <p>*Enrollment Management-Campus Involvement</p> <p>Chemistry has taken an active role in participating in campus efforts to write an Enrollment Management Plan. Our department sees equity in the details especially in providing a reliable and managed schedule with minimal cancellations. Dr. Budzynski is the lead faculty member in this campus wide effort. Other chemistry faculty are the co-leads in the subgroups and these include. Dr. Paula Gustin as a faculty co-lead in the Innovation and Partnership Work Group. Ms. Danica Moore is the faculty co-lead in the Communication</p>
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and Marketing. Dr. Chang, Dr. Hernandez, and Dr. Sardo also participated in the subgroups.

*Participation in Campus Wide Registration Days.

This work was done by Dr. Budzynski, Dr. Fusco Hernandez, Dr. Gustin, and Ms. Moore. Chemistry participated and coordinated with counseling in Registration Workshops (two different ones) and Financial Aid Workshop. These are great ways to informally help students and work with counselors (P. Rodriguez and G. Adona) and other STEM departments to answer questions regarding courses.

*Faculty Led Workshops Lead: Dr. Sardo/Dr. Gustin Fall 2022: These workshops were funded in response to student success data and observations from 2021-2022. Students were struggling in post pandemic courses. Total 27 sessions, 196 total visits = 7.3 students on average per session.

* Study Jams Lead: Dr. Fusco Hernandez Fall 2022 Interdisciplinary study time with faculty where students can attend before midterms and finals.

*Caffeine with Chemistry Lead: Ms Moore Fall 2022 This has been in response to the college feeling lifeless due to college being online. Caffeine with Chem was a way of creating a positive space where students can have coffee with professors. This has been very successful.

*ACS Chem Club Lead: Dr. Chang Fall 2022 Dr. Chang resurrected the American Chemistry Society Chemistry Club. It had 40+ members! This was a great way of providing students with an in person collaboration and a place of belonging in STEM. Collaborations are campus wide with such areas as Fashion.

*Lab Redesign: Many laboratory manuals have been updated or redesigned in Chem 100L, 152L, 231L, 233L and 103. Thanks to Dr. Fusco Hernandez, Ms. Moore, Dr. Saidane, and Dr. Sardo

*Sustainability

Our students show a strong interest in environmental issues and sustainability and our department has an environmentally focused curriculum in many courses. Our Chemistry 111/111L which discusses climate change, water and air pollution, and the disproportionate impact on communities of color. Many of our laboratory courses-Chem

		<p>200L and 201L- which serve our STEM majors of engineering and biology have laboratory analysis that is related to the environment. This is particularly focused on water pollution. There has also been an active effort on the part of our six Lab Coordinators to participate in Green Chemistry Lab Redesign to reduce chemical usage, and substitute more environmentally friendly chemicals into experiments where possible. New faculty can develop a new curriculum for Chem 200/20 that expands on environmental themes, as well as help in this development for other courses, workshops, and even work with our departments. The Allied Health track courses (Chem 100, 130, 103, 160) also have a curriculum module which discusses climate issues with respect to healthcare issues and racial inequities. Chemistry faculty (Mr. Fremland, Dr. Paula Gustin) have been involved with the campus efforts led by the Environmental Sustainability Committee by participating in their Climate Literacy Survey. This semester (Dr. Budzynski and Dr. Paula Gustin) have agreed to join the faculty workshops in the hopes of obtaining a LEAF designation on the course outline of record for Chem 111/111L. In addition, we have worked with the English Department faculty (Ranmali Rodrigo and Robert Pickford) and Chairs (Jill Moreno Ikari and Chris Sullivan) to form an interdisciplinary work group that we affectionately call STEMGLISH. This group worked collaboratively to not only have climate and healthcare focused topics for the English 101 class, but also to schedule one section in the STEM building and to actively encourage chemistry student enrollment in these English courses. It is part of our department's commitment to educating students regarding climate action and responsible stewardship.</p>
<p>What other factors (internal or external) might also impact the above data trends and equity gaps?</p>	<p>Items to consider: legislative changes, fiscal changes, staffing changes, recruitment, hiring, and retention practices.</p>	<p>This was addressed earlier in document:</p> <p>The main consensus was that the source of this anomaly was that this semester started remotely for three weeks due to the Omicron wave. Faculty discussed how this completely changed the dynamics of the class as the first three weeks tend to focus on unit conversions which are foundations to the rest of the course. This remote period is most likely the cause of this unusually low success rate data.</p> <p>There is also the major effect of AB 705. The prerequisite for Chemistry 152 is Math 96 or M50. However, due to AB 705, most students are clearing the M50 level and can register for Chem 152 without being prepared with the algebra skills needed for the course. From data provided by IE, many students are taking Math 116, 104, or 119 concurrently with Chemistry 152. However, students may not have the algebra skills. Students can clear M50 with three years of high school math (IM 1, 2, and 3). It also means that a student can potentially take Chemistry 152 without having had math in high school senior year. Many</p>

		<p>students enrolling at Mesa are not coming directly from high school. So, recency of math is undoubtedly an issue. Many may clear M50 without having any recent recollection of algebra.</p> <p>In addition, students in Fall 2021 and Spring 2022 would have been in online coursework in high school. There have been many articles published regarding the negative impact online learning had on skills in math. https://www.nasbe.org/the-impact-of-covid-19-on-math-achievement/</p> <p>These are believed to be the factors in our Fall '21 and Sp '22 academic year.</p>
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Unit Goals and Action Plans

Prompt	Guidance	Program Response
Unit Goals	Goals should connect to Data and Practice Reflections. Goals should be Specific, Measurable, Attainable, Relevant, and Time-bound.	<p>Goal 1: Continued involvement and leadership in the HSI Equity, Excellence, and Exito Grant. Currently, five chemistry faculty are heavily involved in the grant. Dr. Fusco Hernandez is the PI, Dr. Paula Gustin is the faculty chair of the Curriculum Work Group, Dr. Budzynski is the chair of the Classroom Redesign Project. We intend on being active in STEM Curriculum Alignment Projects, Curriculum Maps, and AB 1705 discussions.</p> <p>Goal 2: Analyze data from the Acceleration Chemistry 200 Project in the next Program Review Year. General Chemistry faculty are working through the Interdisciplinary STEM Curriculum Writing Group, focusing on pathways for students to accelerate in the General Chemistry path for students with higher math levels. Next cycle there will be enough data to discuss the approach and begin institutionalizing this pathway.</p> <p>Goal 3: Hire two full time faculty- Analytical Chemistry and General Chemistry Faculty. In light of impending retirements and enormous amounts of faculty participation in college, it is critical that we offer Chemistry 251 for our chemistry majors.</p> <p>Goal 4: Create more student-centered spaces: Under Dr. Budzynski's leadership, we are looking forward to redesigning our computer lab area to be a warm, inviting space for instructor and student interaction. A permanent home for our Caffeine with Chemistry. We would love the vibe of the STEM Center or LOFT.</p> <p>Goal 5: Increase representation of African American students:</p>

		<p>The goal of the department will be to seek ways to improve the numbers of African American students in General Chemistry and Organic Chemistry to at least match the 6% representation of the college. One approach is to work more closely with counseling. Recruiting and retaining African American students in STEM will require more community outreach with high schools and working closely with a counseling representative. Actively recruiting for our Chemistry Club may also be a possible venue to support Black/African American students.</p> <p>Goal 6: Increase Work Based Learning Opportunities for students.</p> <p>Working with Ms. Moore (Faculty Work Based Learning STEM Coordinator), we can provide more opportunities for students in the area of work-based learning.</p> <p>Goal 7: Analyze Enrollment Trends and Latinx Representation in Organic Chemistry</p> <p>Survey Chemistry 201 students to learn more about their plans for Organic Chemistry. Are they transferring before taking this class? This will help us to determine enrollment trends and perhaps understand why the Latinx representation is lower in that sequence.</p>
<p>Mesa2030 Roadmap Strategic Objective (SO) Alignment</p>	<p>Review Mesa2030 and the Roadmap to Mesa2030, only link to SO's that your goal clearly and intentionally is meant to contribute to, each goal should link to 1 or more SOs</p>	<p>Goal 1: SO: Pathways and Partnerships SO:Scholarship</p> <p>Goal 2: SO: Pathways and Partnerships SO:Scholarship</p> <p>Goal 3: SO: Scholarship SO: Pathways and Partnerships SO: Stewardship</p> <p>Goal 4: SO: Community SO: Scholarship</p> <p>Goal 5: SO: Community SO: Scholarship</p> <p>Goal 6:</p>

		<p>SO: Scholarship SO: Pathways and Partnerships SO: Stewardship</p> <p>Goal 7: SO: Scholarship SO: Pathways and Partnerships</p>
<p>Identify specific actions your program/service area will engage in to accomplish this goal.</p>	<p>Examples may include: policy or practice changes; unit initiatives, curricular changes, etc.</p>	<p>Goal 1</p> <ol style="list-style-type: none"> 1. Curriculum Alignment Projects, Curriculum Maps, and AB 1705 discussions. 2. Path to STEM Success Day & Noche de La Familia <p>Goal 2</p> <ol style="list-style-type: none"> 1. Work with IE to collect data 2. Present data to department and Curriculum Work Group <p>Goal 3</p> <ol style="list-style-type: none"> 1. Participate in hiring committee <p>Goal 4:</p> <ol style="list-style-type: none"> 1. Participate in STEM classroom redesign. 2. Seek funding for STEM LOFT on Fourth Floor <p>Goal 5:</p> <ol style="list-style-type: none"> 1. Work with Chemistry Club to recruit African American Students 2. Work with counseling/outreach <p>Goal 6:</p> <ol style="list-style-type: none"> 1. Regular meetings with our STEM Liaison 2. Communication flow to department from Work Based Learning <p>Goal 7:</p>

		1. Write a survey 2. Collect data & report out to department
Does this Action Plan require resources	if yes, complete resource request form	<input checked="" type="checkbox"/> Yes- FULL TIME FACULTY <input type="checkbox"/> No
Lead Writer and Manager Information		
Lead writer Name(s)	Dr. Paula Hjorth-Gustin	
Name of Program/Unit	Chemistry	
Manager Name	Dr. Jennifer Carmichael	
Submission Date of Program Review Draft to Manager for feedback	Submitted 5/15 via email Returned with feedback 5/18	
Submission Date of Program Review Final Draft to Office of Institutional Effectiveness	5/25/2023	