

## Chemistry Program Review Fall 2022

### Cover

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#### Overview

#### **Program Review Year**

**Title** Chemistry Program Review Fall 2022

**Year of Last Comprehensive Review** Fall 2017

**Year of Last Mini Update, if applicable**

**Originator** Srinivasan, Preeti

**Area Dean** Antoinette Herrera

#### **Division**

Math, Sci. & Engineering

#### **Department**

Chemistry

#### Subject

- CHEM - Chemistry

#### **Is this a review for a degree/certificate or all the courses in the subject?**

All Courses

#### Courses

- CHEM 001A - General Chemistry - Historical
- CHEM 001A - General Chemistry - Historical
- CHEM 001B - General Chemistry - Historical
- CHEM 001B - General Chemistry - Historical
- CHEM 001B - General Chemistry - Historical
- CHEM 010 - Current Topics in Chemistry - Historical
- CHEM 011A - General Chemistry (Engineering Majors) - Historical
- CHEM 011B - General Chemistry - Historical
- CHEM 011S - Chemistry for Engineers Supplement - Historical
- CHEM 012A - Organic Chemistry - Historical
- CHEM 012A - Organic Chemistry - Historical
- CHEM 012B - Organic Chemistry - Historical
- CHEM 012B - Organic Chemistry - Historical
- CHEM 015 - Fundamentals of Chemistry - Historical
- CHEM 015 - Fundamentals of Chemistry - Historical
- CHEM 030A - Introduction to Chemistry - Historical
- CHEM 030A - Introduction to Chemistry - Historical
- CHEM 030A - Introduction to Chemistry - Historical
- CHEM 030B - Introduction to Chemistry - Historical

- CHEM 030B - Introduction to Chemistry - Historical
- CHEM 030B - Introduction to Chemistry - Historical
- CHEM 047 - CAI in Chemistry - Historical
- CHEM 065 - Quantitative Analysis - Historical
- CHEM 088P - Chemistry General Work Experience-Parallel Plan - Historical
- CHEM 089 - Organic Chemistry - Historical

## Co-Contributors

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\*Co-Contributor must be chosen before proposal is launched

- Brown, Bonnie
- Chau, Charles
- Ghebreab, Michael
- Herrera, Antoinette

## Overview

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**Evergreen Valley College guides all students to pathways that reach their educational and career goals through equity-centered, innovative academic programs and support services. By creating a learning environment where everyone feels welcomed and supported, we are committed to a culture of inquiry, growth, and respect that creates an equitable society in which all can participate and prosper.**

**1.Student-Centered: We provide access to quality and efficient programs and services to ensure student success.**

- Access
- Curriculum and programs
- Services

**2. Community Engagement: We will transform the college image and enhance partnerships with community, business and educational institutions.**

**Areas of focus are:**

- Increase visibility
- Develop strategic partnerships
- Building campus community

**3.Organizational Transformation: We create a trusting environment where everyone is valued and empowered.**

**Areas of focus are:**

- Communication
- Employee development
- Transparent Infrastructure

- **1. Provide a brief summary of your program. Please include a brief history and discuss any factors that been important to the program's development.**

Since the beginning of Evergreen Valley College (EVC) in 1975, the chemistry department has been instrumental in offering quality courses in chemistry for a variety of students, including traditional full-time college students, working students, dual enrollment (high school) students, and adult-learners.

For nearly fifty years, the chemistry department at EVC has played a vital role in helping our students obtain careers in a variety of fields, including chemistry, other sciences, engineering, and health care.

The Chemistry Program encompasses a diverse field of courses sharing the unique EVC mission: "With equity, opportunity and social justice as our guiding principles, Evergreen Valley College's mission is to empower and prepare students from diverse backgrounds to succeed academically and to be civically responsible global citizens." Guided by the college's Commitments to Action and focusing on Student Centeredness, Community Engagement, and Organizational Transformation, the Chemistry program is committed to providing education to students of all ages and backgrounds, preparing them to succeed in a global and multicultural society.

Several important developments of the Chemistry Program include the introduction and offering of the Associate of Arts (A.A.) in Chemistry and the Associate of Science for Transfer (AS-T) degrees and the Foundational Chemistry Certificate. The Associate of Arts (A.A.) in Chemistry allows students to transfer to a four-year institution as a chemistry major. The Associate of Science for Transfer (AS-T) in Chemistry is for students wishing to transfer with an associate degree in science. The Foundational Chemistry certificate program is designed to provide proof for employers that students have the core competencies to begin work at the entry level. These programs include one foundational chemistry course (Fundamental of Chemistry), the two-semester Introduction to Chemistry (for health science majors), the chemistry majors sequence which includes the two-semester General Chemistry, and the two-semester Organic Chemistry sequences. Our courses also satisfy the General Education requirements for other AA or AS degrees offered by Evergreen Valley College.

Some of the factors that have contributed to the growth of the Chemistry program are state-of-the-art equipment and facilities, student-support services, supplemental learning opportunities outside the classroom, and textbook price reduction and open-education resource textbooks. Chemistry courses are offered at times that best support student schedules. Our courses have been submitted for constant reviews and updates, incorporating new instructional methods and technologies as delivered by the ever-growing Silicon Valley high-tech industry. In addition, the program has committed to the hiring of new faculty and staff, continuing staff professional development, and participating in on-campus and off-campus STEM outreach activities.

- **2. Please provide an update on the program's progress in achieving the goals (3 years) set during the last comprehensive program review.**

In the last comprehensive review (2016-2017), the chemistry department set forth to accomplish a few main goals: (1) development of additional courses (such as physical chemistry) and (2) establishing an Associate of Science for Transfer (AS-T) degree.

Goal 1: Since the last review, the chemistry department decided not to proceed with the development of new courses. Instead, we focused on adding more sections to our already existing courses in order to meet increased student enrollment in our Chemistry program. Indeed, we have added one more section of CHEM 012A (Organic Chemistry I) and one more section of CHEM 012B (Organic Chemistry II). We also added two more sections of CHEM 030A (Introduction to Chemistry) (one section on Friday's) and converted CHEM 030B (Introduction to Chemistry II) to a hybrid modality to

accommodate the need and increase in students embarking on careers in the allied health sciences, including nursing. We are in the process of adding CHEM 030A and CHEM 015 hybrid courses to also accommodate student needs and schedules.

Goal 2: In terms of the AS-T degree, we were able to establish and received state approval for this new AS-T degree for the chemistry program that would help to reduce the number of units needed for our students to transfer to four-year universities. In addition to the AS-T degree, we also added a Foundational Chemistry certificate program to meet student needs.

In order to accomplish these two main goals, the chemistry department successfully hired two new full-time, tenured track faculty members and incorporated new instruments and software into our labs (a new infrared spectroscopy instrument, a new gas chromatography (GC/MS) instrument, one nuclear magnetic resonance (NMR) instrument, and updated Spartan software). The result was an increase of 24% in student enrollment prior to the COVID-19 pandemic.

- **3. Please state and recent accomplishments for your program and show how it contribute to the College's mission and success.**

The Chemistry program has accomplished significant improvements from the previous Program Review (2016-2017) guided by EVC's mission "to empower and prepare students from diverse backgrounds to succeed academically and to be civically responsible global citizens". (1) We have established and maintained a section of CHEM 015 AFFIRM designed to increase the retention, matriculation, and transfer of African American students.

(2) Student retention and success rate: The EVC student population is historically a diverse population. Improving the retention and success rate of this student population is crucial to meeting EVC's mission of preparing students from diverse backgrounds to succeed. Although most Evergreen Valley College students do not major in chemistry, the students take our courses as part of their requirement for graduation in other majors, such as Biology, Computer Sciences, Physics, and Engineering, as well as for transferring to four-year universities. As such, it is crucial that we have a chemistry program with high student success rates. According to data shown in the Program Set Standards section, the Chemistry program has increased its student success rate. Our program went from a student success rate of an average of 63.77% during the last program review to an average of 70.63% for this program review period. This is just slightly less than the school's set standard of 72% student success rate. (2) SLO implementation and SLO assessment: The Chemistry program has implemented and assessed SLO's consistently since the last program review. We plan to improve our SLO assessments by creating a standard set of SLO assessments for each of our courses to improve upon our student learning outcome assessments. (3) Student enrollment: During the previous program review, the Chemistry program's total student headcount averaged about 400 students. During this program review cycle, the total student headcount is 502. This increase in total student headcount is also accompanied by an increase in FTE's. During the previous program review, the Chemistry program's FTE's averaged about 100 students. During this program review cycle, the FTE's went up to 325 for 2020-2021. Unfortunately, the effects of the Covid-19 pandemic caused a dramatic decrease to 254 in 2021-2022. We hope to continue our upward trend in student enrollment numbers in the future.

- **4. If you received resource allocation for your last program review cycle, please indicate the resources you received and how these resources were utilized to impact student success and / or importance to your program. (The resources can be personnel or fiscal)**

During this program review period, we acquired the following resources to improve our lab curriculum. (1) A new Nuclear Magnetic Resonance (NMR) spectrometer was acquired and installed in 2017-2018. It is now being used in CHEM12A (Organic Chemistry I) labs. We plan to modify our CHEM12A lab manual that will incorporate more use of the NMR machine. (2) A Fourier Transform Infrared (FTIR) spectrometer was acquired and installed in 2019-2020. It is a much needed update to our old FTIR spectrometer. This updated spectrometer is used extensively in CHEM12A (Organic Chemistry I) labs. (3) A new Gas Chromatograph/Mass Spectrometer (GC/MS) was acquired and installed in 2019-2020. Again, this is another much needed update to our old instruments. This updated GC/MS is currently being used in our CHEM12A (Organic Chemistry I) and CHEM12B (Organic Chemistry II) labs. We also plan to modify our CHEM12B lab manual to incorporate more use of this GC/MS machine. (4) An increase in our lab budget to cover material expenses was received in 2022. This increase in the Chemistry budget was necessary since the previous budget had dramatically underestimated the cost of maintaining and running our Chemistry program.

- **5. Please describe where you would like your program to be three years from now (program goals) and how these support the college mission, strategic initiatives and student success.**

Over the next three years, we envision many changes to our program in order to meet the changing needs of our students. (1) To improve upon our student success, we plan to introduce more hybrid (a mix of online and in-person learning) courses, such as CHEM 030A and CHEM 015. This may also have the benefit of increasing student enrollment from diverse and disadvantaged backgrounds, because hybrid courses offer schedule flexibility. To enhance our hybrid offerings, we would like to upgrade the computers and monitors (to drawing monitors) in the lecture rooms and lab rooms.

(2) To improve upon our SLO assessments in order to more effectively improve our courses, we plan to accomplish this SLO improvement by implementing a standard set of SLO assessments for each course. This is to support EVC's mission to student success.

(3) We would also like to convert more courses to low-cost or zero-cost textbook courses, to support EVC's mission towards an equity-centered learning environment.

(4) We would like to combine all our labs (via relocating CHEM 001B and CHEM 030B labs from the Acacia Building) inside one building (MS3 Building) to improve lab efficiency and lab safety. Lab efficiency will lead to better student success.

(5) We are in the process of coordinating with EVC's community outreach programs to take a more active approach in reaching out to high school students and international students in order to promote EVC and the EVC chemistry department. This will increase enrollment of students from diverse backgrounds.

## Program Set Standards (Summary Tab)

**Overall, EVC's Institution Set Standard for success rate is 72%, and the aspirational goal for student success is 75%.**

Success Rate (completion with "C" or better)	Program	EVC	Program Set Standard (established during last comprehensive PR)	Program Success Goal (new)
F'15-F'21 average		72.00%		

**Courses with no Degree or Certification**

CHEM 011B - General Chemistry	Created: 10/21/2014
**New Course**	Originator: System Loaded
CHEM 011S - Chemistry for Engineers Supplement	Created: 10/21/2014
**New Course**	Originator: System Loaded
CHEM 012A - Organic Chemistry	Created: 10/21/2014
**New Course**	Originator: System Loaded
CHEM 012B - Organic Chemistry	Created: 10/21/2014
**New Course**	Originator: System Loaded
CHEM 015 - Fundamentals of Chemistry	Created: 10/21/2014
**New Course**	Originator: System Loaded
CHEM 015 - Fundamentals of Chemistry	Created: 06/22/2015
**Modify Course**	Originator: Vicki Brewster
CHEM 030A - Introduction to Chemistry	Created: 09/05/2015
**Modify Course**	Originator: Preeti Srinivasan
CHEM 030A - Introduction to Chemistry	Created: 11/24/2018
**Modify Course**	Originator: Charles Chau
CHEM 030A - Introduction to Chemistry	Created: 10/21/2014
**New Course**	Originator: System Loaded
CHEM 030B - Introduction to Chemistry	Created: 10/21/2014
**New Course**	Originator: System Loaded
CHEM 030B - Introduction to Chemistry	Created: 06/27/2020
**Create / Modify DE Course**	Originator: Charles Chau
CHEM 030B - Introduction to Chemistry	Created: 11/24/2018
**Modify Course**	Originator: Charles Chau
CHEM 047 - CAI in Chemistry	Created: 10/21/2014
**New Course**	Originator: System Loaded
CHEM 065 - Quantitative Analysis	Created: 10/21/2014
**New Course**	Originator: System Loaded
CHEM 088P - Chemistry General Work Experience-Parallel Plan	Created: 10/21/2014
**New Course**	Originator: System Loaded
CHEM 089 - Organic Chemistry	Created: 10/21/2014
**New Course**	Originator: System Loaded
CHEM 001A - General Chemistry	Created: 10/21/2014
**New Course**	Originator: System Loaded
CHEM 001B - General Chemistry	Created: 10/21/2014
**New Course**	Originator: System Loaded
CHEM 001B - General Chemistry	Created: 06/17/2020
**Modify Course**	Originator: Bonnie Brown
CHEM 001A - General Chemistry	Created: 02/06/2020
**Modify Course**	Originator: Preeti Srinivasan
CHEM 001B - General Chemistry	Created: 11/24/2018
**Modify Course**	Originator: Charles Chau
CHEM 010 - Current Topics in Chemistry	Created: 10/21/2014
**New Course**	Originator: System Loaded
CHEM 011A - General Chemistry (Engineering Majors)	Created: 10/21/2014
**New Course**	Originator: System Loaded
CHEM 012B - Organic Chemistry	Created: 01/31/2019
**Modify Course**	Originator: Preeti Srinivasan

CHEM 012A - Organic Chemistry

Created: 12/03/2018

\*\*Modify Course\*\*

Originator: Preeti Srinivasan

**Program Success Rate 70.63%**

**Program Set Standard**: It is recommended that programs identify a success standard. This standard should reflect the baseline success rate.

**Program Set Standard 65%**

**Recommendation**: 90% of the 6 year average success rate could be your program standard (average x 0.9).

**Program Success Goal**: It is recommended that programs identify a success goal. This goal should reflect the success rate to which your program aspires.

**Program Success Goal 74%**

- **Is your program success rate higher or lower than the campus?**

Overall, the Chemistry program's success rate of 70.63% is lower than the average overall success rate for the campus. It is also slightly lower than the EVC standard success rate of 72.00%.

- **If your success rate is higher than the campus, how are you helping students succeed in and outside the classroom? If your program success rate is lower, what are some strategies your program is implementing to improve?**

To improve our program success rate, our strategies for the future are:

- Improving state-of-the-art equipment and facilities
- Offering student-support services and supplemental learning opportunities outside the classroom, such as the Peer-Led Tutoring Learning (PLTL) program
- Hiring more full-time faculty and more staff
- Increasing staff professional development, such as funding and attending academic conferences focused on new teaching methodologies.

Success Rates: Measures by IPEDs Race/Ethnicity

- **American Indian: 102 - 78.380%**

**Program Average Total Enrolled**

2.000

**Program Success Rate**

75.000

- **Asian: 9380 - 79.320%**

**Program Average Total Enrolled**

248.000

**Program Success Rate**

78.800

- **Black or African American: 464 - 61.430%**

**Program Average Total Enrolled**

10.000

**Program Success Rate**

64.910

- **Hawaiin/Pacific Islander: 95 - 65.790%**

**Program Average Total Enrolled**

2.000

**Program Success Rate**

5.940

- **Latinx: 9005 - 64.730%**

**Program Average Total Enrolled**

162.000

**Program Success Rate**

59.300

- **Two or More Races: 614 - 70.030%**

**Program Average Total Enrolled**

17.000

**Program Success Rate**

67.040

- **Unknown: 1655 - 72.640%**

**Program Average Total Enrolled**

30.000

**Program Success Rate**

69.140

- **White: 1256 - 73.480%**

**Program Average Total Enrolled**

32.000

**Program Success Rate**

69.360

## Success Rates: Measures by Gender

- **Female: 12340 - 73.970%**

**Program Average Total Enrolled**

295.000

**Program Success Rate**

71.180

- **Male: 10154 - 69.610%**

**Program Average Total Enrolled**

207.000

**Program Success Rate**

69.790

- **No Value Entered: 77 - 72.590%**  
**Program Average Total Enrolled**  
2.000  
**Program Success Rate**  
78.790

## Success Rates: Measures by Age

- **17 & Below: 736 - 86.260%**  
**Program Average Total Enrolled**  
9.000  
**Program Success Rate**  
77.500
- **18-24: 15285 - 69.350%**  
**Program Average Total Enrolled**  
370.000  
**Program Success Rate**  
70.010
- **25-39: 4470 - 75.390%**  
**Program Average Total Enrolled**  
107.000  
**Program Success Rate**  
71.040
- **40 & Over: 2065 - 78.860%**  
**Program Average Total Enrolled**  
17.000  
**Program Success Rate**  
76.580
- **Unknown: 16 - 71.080%**  
**Program Average Total Enrolled**  
1.000  
**Program Success Rate**  
66.670
- **a. With respect to disaggregated success rates, list any equity gaps that are identified and discuss interventions your program will implement to address these equity gaps? Please include a timeline of implementation and reassessment.**

The LatinX success rate of 59.3 % and the Hawaiian/Pacific Islander's of 56.94% were below the program's set standard. Some of the means to address these equity gaps include incorporating embedded tutors in classrooms, coordinating with special academic programs such as Enlace, Aspire, UMOJA-Affirm, and Accel Middle College to provide mentorship on how to succeed in chemistry courses. Review the results in three years after the implementation.

- **b. With respect to disaggregated success rates (ethnicity / race, gender and age), discuss student performance in reaching your program set standard for student success as well as reaching the program success goal.**

White, Asian and American Indian success rates were above the standard success rate.

African American success rates was at the standard success rate.

The LatinX success rate of 59.3 % and the Hawaiian/Pacific Islander's of 56.94% were below the program's set standard.

There was no disparity in the success rate between genders.

Age 17 & below have the highest success rate.

- **c. If your program offers course sections fully online, please contact the office of Research, Planning and Institutional Effectiveness to obtain a student success report on the online sections. Address any differences in student success rates between fully online courses and classroom courses.**

We do not offer fully online Chemistry courses.

## Program Awards - If Applicable

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If the classes in your program lead to a degree or certificate, please visit the DataMart and indicate how many degrees/certificates were awarded in your program:

[http://datamart.cccco.edu/Outcomes/Program\\_Awards.aspx](http://datamart.cccco.edu/Outcomes/Program_Awards.aspx)

([http://datamart.cccco.edu/Outcomes/Program\\_Awards.aspx](http://datamart.cccco.edu/Outcomes/Program_Awards.aspx))

You will need to select drop down menus and then “select program type by major of study” (for example, select Legal for paralegal studies).

Then at the bottom of the report, select the box “program type- four digits TOP”, then update report to get program specific information.

Degree Type

- **AA**

**Number of Awards (Examine 2017-18, 2018-19 data, 2019-20 data and 2020-21 data)**

58

### Discussion

From 2015-16 to 2021-22, EVC Chemistry awarded 58 AA degrees. There was a gradual rise in the number from 2015-2018 to a high of 15 awards, then a huge decline to only 2 in 2019-20, possibly due the onset of the COVID-19 pandemic. This was followed by a sharp rise to 12 awards in 2020-21,

when classes moved to the remote learning modality, but a drop back to 6 awards in 2021-22, which might be just a reflection of a drop in overall enrollment or could be the severity of the COVID-19 spread and with strict regulations such as vaccination record submissions etc.

- **AS-T**

**Number of Awards (Examine 2017-18, 2018-19 data, 2019-20 data and 2020-21 data)**

5

**Discussion**

The AS-T in Chemistry was first effective in 2019. The academic year 2020-21 had the first class with 5 awards. The year 2021-22 had no awards, possibly a result of the COVID-19 pandemic.

- **Certificate of 12-18 units**

**Number of Awards (Examine 2017-18, 2018-19 data, 2019-20 data and 2020-21 data)**

22

**Discussion**

The Foundational Chemistry Certificate of Achievement was first effective in Fall 2019. The academic year 2020-21 had the first class of awardees with a high of 16 awards. The year 2021-22 saw a sharp decline to 6 awards, possibly a result of the COVID-19 pandemic.

## Student Enrollment Types

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Student Enrollment Type: Day or Evening Student

- **Day: 4639 - 50.900%**

**Program Average Headcount**

200.000

**Program Percentage of Total**

42.800

- **Day & Evening: 2929 - 32.100%**

**Program Average Headcount**

242.000

**Program Percentage of Total**

51.600

- **Evening: 1022 - 11.200%**

**Program Average Headcount**

26.000

**Program Percentage of Total**

5.500

- **Unknown: 530 - 5.800%**

**Program Average Headcount**

0.000

**Program Percentage of Total**

0.000

Student Enrollment Type: Academic Load

- **Full Time: 2259 - 24.800%**

**Program Average Headcount**

199.000

**Program Percentage of Total**

39.400

- **Half Time or less than half time: 6084 - 66.700%**

**Program Average Headcount**

273.000

**Program Percentage of Total**

54.100

- **a. Discuss any changes in program enrollment types (day vs evening, full-time vs part-time) since your last program review?**

As per our last program review, total program FTES was 180 yearly.

In the current 6-year period, the Chemistry program has an average yearly FTES of 287. It gradually rose from a low FTES of 247, peaked to an FTES of 325 in the year 20-21, which was the first year of the COVID-19 pandemic, then dipped back to a low FTES of 254 in the second year of the pandemic. This sharp decline in the last two years accounts for a 21.9% loss in enrollment in the program. Day and day-evening students make up 94.4% of the total headcount, while a low 5.5% makes up the evening student population. Full-time students make up 39.4%, while part-time students make up 54.1% of the total headcount.

- **b. Discuss how do your program enrollments (Pct of total) compare to EVC?**

Our evening students make up only 5.5% of the total headcount compared to the 11.2% evening students college-wide. On the other hand, our program has a higher full-time student population of 39.4% compared to the 24.8% college-wide full-time students.

- **c. Based on the data, would you recommend any changes?**

Since our program has a higher percentage of full-time students compared to the percentage college-wide, no changes need to be implemented in that area. However, to increase enrollment of evening students, we recommend the introduction of online-hybrid and evening classes, outreach to neighboring high schools such as Silver Creek High School and Andrew Hill High School, and coordination with the ACCEL Middle College special program.

## Student Demographics - Headcount

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## Student Demographic: Gender

- **Female: 5008 - 54.950%**  
**Program Headcount**  
295.000  
**Program Percentage of Total**  
58.400
- **Male: 4075 - 44.640%**  
**Program Headcount**  
207.000  
**Program Percentage of Total**  
41.250
- **No Value Entered: 37 - 0.410%**  
**Program Headcount**  
2.000  
**Program Percentage of Total**  
0.400

## Student Demographic: Age

- **17 & Below: 486 - 5.310%**  
**Program Headcount**  
9.000  
**Program Percentage of Total**  
1.710
- **18-24: 5493 - 60.210%**  
**Program Headcount**  
371.000  
**Program Percentage of Total**  
73.610
- **25-39: 2168 - 23.800%**  
**Program Headcount**  
107.000  
**Program Percentage of Total**  
21.210
- **40 & Over: 966 - 10.600%**  
**Program Headcount**  
17.000  
**Program Percentage of Total**  
3.410
- **Unknown: 8 - 0.090%**

**Program Headcount**

1.000

**Program Percentage of Total**

0.230

## Student Demographic: Race/Ethnicity (IPEDs Classification)

- **American Indian: 40 - 0.430%**  
**Program Headcount**  
2.000  
**Program Percentage of Total**  
0.470
- **Asian: 3689 - 40.480%**  
**Program Headcount**  
248.000  
**Program Percentage of Total**  
49.100
- **Black or African American: 208 - 2.290%**  
**Program Headcount**  
11.000  
**Program Percentage of Total**  
2.130
- **Hawaiian/Pacific Islander: 36 - 0.400%**  
**Program Headcount**  
2.000  
**Program Percentage of Total**  
0.310
- **Latinx: 3636 - 39.850%**  
**Program Headcount**  
163.000  
**Program Percentage of Total**  
32.090
- **Two or More Races: 248 - 2.730%**  
**Program Headcount**  
17.000  
**Program Percentage of Total**  
3.460
- **Unknown: 690 - 7.520%**  
**Program Headcount**  
30.000

**Program Percentage of Total**

6.250

- **White: 573 - 6.300%**

**Program Headcount**

32.000

**Program Percentage of Total**

6.290

- **a. Based on the program total headcount and percent change year to year, discuss if your program growing or declining. If so, what do you attribute these changes in enrollment to and what changes will the program implement to address them?**

From Fall 2015 to Fall 2019, headcount peaked every Spring and slightly dipped in Fall semesters, but overall there was a gradual increase in total headcount. Surprisingly, Fall 2020 saw the highest headcount across all enrollment types and demographics, which could be attributed to the availability of the remote learning modality in the COVID-19 pandemic. Headcount has declined substantially since then in Spring and Fall 2021, which possibly parallels the decrease in enrollment.

- **b. Discuss any gaps have you identified in your program. Discuss how your program enrollment is similar or different from the campus. Discuss which gender, age, and/or ethnic group are proportionally smaller than campus make up.**

Among ethnic groups, American Indian, Black/African-American, Hawaii/Pacific Islander, and White populations have significantly lower headcounts in the program compared to Latinx and Asian populations by about 29-46% respectively. This is significantly different from the college-wide headcount difference of 36% for these populations. By gender, male populations are lower than female populations in the program by about 17%. This is higher than the college-wide difference of 10%. Comparing age groups, headcounts in the 25-39 age group are about 52% lower than the 18-24 age group, and severely decline to 1.71-3.41% in the 40+ and below 17 age groups. This is significantly higher than the college-wide difference.

- **c. Discuss what interventions the program can implement to address any gaps in enrollment.**

To reduce the gap in ethnic disparity, we would work with special academic programs such as Umoja-AFFIRM and ASPIRE to do outreach in the EVC community. Another way to reduce the gender disparity is to offer classes in the evenings, to provide opportunities for working male students. To reduce age group disparity, we would work with special programs such as ACCEL Middle College and offer courses to meet the high school students' schedules.

**Institutional Effectiveness (6.5 year average, see Summary Tab)**

EVC Capacity: 61.70% EVC Productivity: 14.43

**Program Capacity**

74.32%

**Program Productivity**

16.15

**Is your capacity rate higher or lower than the campus?**

Higher

**Is your productivity goal higher or lower than the campus?**

Higher

**If the program capacity and/or productivity is lower than the campus, please provide rationale:**

N/A

**Curriculum**

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**Related Assessments**

1A 201 202 FA19 SLO- Created: 01/24/2020 New Section Level SLO Assessment Report Originator: Preeti Srinivasan (/Form/Module/Index/174)

1A 201 202 FA19 SLO- Created: 01/24/2020 New Section Level SLO Assessment Report Originator: Preeti Srinivasan (/Form/Module/Index/208)

1A 201 202 FA19 SLO- Created: 01/24/2020 New Section Level SLO Assessment Report Originator: Preeti Srinivasan (/Form/Module/Index/225)

CHEM 001A General Chemistry- Created: 06/18/2020 New Section Level SLO Assessment Report Originator: Preeti Srinivasan (/Form/Module/Index/553)

CHEM 001A General Chemistry- Created: 06/26/2020 New Section Level SLO Assessment Report Originator: Preeti Srinivasan (/Form/Module/Index/562)

CHEM 001A General Chemistry- Created: 06/26/2020 New Section Level SLO Assessment Report Originator: Preeti Srinivasan (/Form/Module/Index/563)

CHEM 001A General Chemistry- Created: 06/26/2020 New Section Level SLO Assessment Report Originator: Preeti Srinivasan (/Form/Module/Index/564)

1A-201-202 FA19 SLO - Created: 01/24/2020 New Section Level SLO Assessment Report Originator: Preeti Srinivasan (/Form/Module/Index/94)

CHEM 001B- Created: 07/28/2020 New Section Level SLO Assessment Report Originator: Charles Chau (/Form/Module/Index/640)

CHEM 001B - General Chemistry Describe the bonding theories of coordination compounds and their chemical behavior- Created: 07/28/2020 New Section Level SLO Assessment Report Originator: Charles Chau (/Form/Module/Index/646)

CHEM 001B -SLO 1 - Created: 07/08/2020 New Section Level SLO Assessment Report Originator: Preeti Srinivasan (/Form/Module/Index/603)

CHEM 001B-SLO-2- Created: 07/08/2020 New Section Level SLO Assessment Report Originator: Preeti Srinivasan (/Form/Module/Index/605)

CHEM 001B-SLO-3- Created: 07/08/2020 New Section Level SLO Assessment Report Originator: Preeti Srinivasan (/Form/Module/Index/606)

CHEM 001B-SLO-4- Created: 07/08/2020 New Section Level SLO Assessment Report Originator: Preeti Srinivasan (/Form/Module/Index/607)

SLO-5- Created: 07/08/2020 New Section Level SLO Assessment Report Originator: Preeti Srinivasan (/Form/Module/Index/608)

CHEM 001B-SLO-6- Created: 07/08/2020 New Section Level SLO Assessment Report Originator: Preeti Srinivasan (/Form/Module/Index/609)

CHEM 012A - Organic Chemistry- Created: 06/26/2020 New Section Level SLO Assessment Report Originator: Preeti Srinivasan (/Form/Module/Index/565)

CHEM 012A - Organic Chemistry- Created: 06/26/2020 New Section Level SLO Assessment Report Originator: Preeti Srinivasan (/Form/Module/Index/566)

CHEM 012A - Organic Chemistry- Created: 06/27/2020 New Section Level SLO Assessment Report Originator: Preeti Srinivasan (/Form/Module/Index/572)

CHEM 012A - Organic Chemistry- Created: 06/27/2020 New Section Level SLO Assessment Report Originator: Preeti Srinivasan (/Form/Module/Index/573)

CHEM 012A - Organic Chemistry- Created: 06/27/2020 New Section Level SLO Assessment Report Originator: Preeti Srinivasan (/Form/Module/Index/574)

CHEM 012A - Organic Chemistry- Created: 06/27/2020 New Section Level SLO Assessment Report Originator: Preeti Srinivasan (/Form/Module/Index/575)

CHEM 012B SLO-1- Created: 06/29/2020 New Section Level SLO Assessment Report Originator: Preeti Srinivasan (/Form/Module/Index/583)

CHEM 012B SLO-1- Created: 07/01/2020 New Section Level SLO Assessment Report Originator: Preeti Srinivasan (/Form/Module/Index/586)

CHEM 012B SLO-2- Created: 07/01/2020 New Section Level SLO Assessment Report Originator: Preeti Srinivasan (/Form/Module/Index/587)

CHEM 012B SLO-3- Created: 07/01/2020 New Section Level SLO Assessment Report Originator: Preeti Srinivasan (/Form/Module/Index/588)

CHEM 012B SLO-4- Created: 07/01/2020 New Section Level SLO Assessment Report Originator: Preeti Srinivasan (/Form/Module/Index/589)

CHEM 012B SLO-5- Created: 07/01/2020 New Section Level SLO Assessment Report Originator: Preeti Srinivasan (/Form/Module/Index/590)

Fundamentals of Chemistry- Created: 07/03/2020 New Section Level SLO Assessment Report Originator: Bonnie Brown (/Form/Module/Index/591)

Fundamentals of Chemistry- Created: 07/03/2020 New Section Level SLO Assessment Report Originator: Bonnie Brown (/Form/Module/Index/592)

Fundamentals of Chemistry- Created: 07/03/2020 New Section Level SLO Assessment Report Originator: Bonnie Brown (/Form/Module/Index/593)

Fundamentals of Chemistry- Created: 07/03/2020 New Section Level SLO Assessment Report Originator: Bonnie Brown (/Form/Module/Index/596)

Fundamentals of Chemistry- Created: 06/30/2020 New Section Level SLO Assessment Report Originator: Bonnie Brown (/Form/Module/Index/584)

Fundamentals of Chemistry- Created: 06/01/2020 New Section Level SLO Assessment Report Originator: Bonnie Brown (/Form/Module/Index/510)

CHEM30A SLO- Created: 01/24/2020 New Section Level SLO Assessment Report Originator: Charles Chau (/Form/Module/Index/125)

CHEM 030B Introduction to Chemistry- Created: 06/17/2020 New Section Level SLO Assessment Report Originator: Preeti Srinivasan (/Form/Module/Index/546)

CHEM 030B Introduction to Chemistry- Created: 06/17/2020 New Section Level SLO Assessment Report Originator: Preeti Srinivasan (/Form/Module/Index/547)

CHEM 030B Introduction to Chemistry- Created: 06/17/2020 New Section Level SLO Assessment Report Originator: Preeti Srinivasan (/Form/Module/Index/548)

CHEM 030B Introduction to Chemistry- Created: 06/17/2020 New Section Level SLO Assessment Report Originator: Preeti Srinivasan (/Form/Module/Index/549)

CHEM 030B Introduction to Chemistry- Created: 06/17/2020 New Section Level SLO Assessment Report Originator: Preeti Srinivasan (/Form/Module/Index/550)

CHEM 030B Introduction to Chemistry- Created: 06/18/2020 New Section Level SLO Assessment Report Originator: Preeti Srinivasan (/Form/Module/Index/551)

- **1. Identify and updates to curriculum since the last comprehensive program review, including and new programs and indicate the 6-year timeline for scheduled course outline revision. For CTE, the time line is 2 year.**

The Associate in Science in Chemistry for Transfer (AST) Degree became effective in 2019. The goal of the AS-T Degree is to provide a lower-division science foundation for those interested in pursuing chemistry as a major field of study. This major prepares students to transfer to California State University campuses. Students considering careers in research, teaching, scientific consulting, medicine, chemical engineering, pharmacy, material science, forensics and biotechnology industries, find the chemistry major an essential academic preparation for entry into these professions. The AS-T in Chemistry is intended for students who plan to complete a baccalaureate degree in Chemistry or a related field of study at a California State University (CSU). Students who complete this degree are guaranteed admission to the CSU system, but not to a particular campus or major. Students transferring to a CSU campus that accepts the AS-T in Chemistry will be required to complete no more than 60 semester units after transferring to earn a baccalaureate degree. Program revision is on a 6-year cycle and is scheduled for the year 2025.

The Foundational Chemistry Certificate program came into effect in 2019. This program grants students a certificate of acknowledgment that they have successfully completed a set of required general chemistry and organic chemistry courses with labs. It is designed to provide potential employers with proof that the students have the core competency to begin work in chemistry at the entry level. In addition to the lecture component where knowledge in chemistry will be mastered, all courses include labs that will provide students with the hands-on skills and experience gained from doing experiments involving different techniques. Completion of the certificate program requires that students successfully complete CHEM 012A and CHEM 012B at Evergreen Valley College. Program revision is on a 6-year cycle and is scheduled for the year 2025.

- **2. Identify all the courses offered in the program and describe how these courses remain relevant in the discipline. For courses your program has not offered in the past two years, please discuss a plan on how to deal with these courses (if your program is not going to deactivate these courses, please explain why).**

CHEM 030A: This course covers the basic principles of chemistry. Content includes measurements, matter and energy, atomic structure, periodicity, chemical bonding and nomenclature, chemical reactions and equations, gases, solutions and colloids, oxygen, hydrogen and water, and acids, bases and salts. It is designed to meet the chemistry requirements for the nursing major, other allied health majors, and non-science majors.

CHEM 030B: This course is a continuation of Introductory Chemistry with emphasis on the basic principles of organic and biological chemistry. It is designed for allied health and industrial technology majors. Topics that will be covered will include hydrocarbons, alcohols, ethers, carbonyl compounds, carboxylic acids, esters, and amines. It will also include an introduction to the structures and properties of carbohydrates, lipids, and other biopolymers.

CHEM 015: This course covers the fundamentals of modern inorganic chemistry with emphasis on atomic structure, chemical bonding, chemical formulas, nomenclature, equations, stoichiometry, gas laws, solutions and related topics. It is intended primarily as a preparation for the Chemistry 001A and 001B sequence. The central nature of chemistry among other branches of science is stressed, and examples of the important role that chemistry plays in our lives are presented.

CHEM 001A: This is the first course in general chemistry with lab, for science and pre-professional majors. It covers basic chemical principles: nomenclature, atomic structure, quantum theory, molecular structure and bonding, periodic properties, chemical reactions, stoichiometry, thermochemistry, states of matter, gas laws, solutions, oxidation-reductions, and molecular equilibrium. The role that chemistry plays in everyday life, industry, and human welfare is emphasized.

CHEM 001B: This course is the second semester of a one-year college level general chemistry sequence. The content includes thermodynamics, chemical kinetics, chemical equilibrium, electrochemistry, coordination compounds, nuclear chemistry, and organic chemistry. The laboratory emphasizes qualitative and quantitative analyses of inorganic compounds and introduces electronic instrumentation. The course is required for students majoring in physical and biological sciences and pre-professional majors such as pre-medicine and dentistry. The course also completes the basic chemistry requirements for students majoring in chemical and materials engineering.

CHEM 012A: The first course of a two-semester sequence in organic chemistry with emphasis on structure, reaction mechanisms, and their kinetics. Topics include nomenclature, stereochemistry, mechanisms, reactions, and spectroscopic studies of organic compounds. Problem-solving techniques will be used to elucidate mechanistic, structural, and stereochemical features of reactions and molecules. Lecture and laboratory will cover synthesis, isolation, purification, elucidation, and identification of organic structures, instrumental methods and data interpretation.

CHEM 012B: This is the second course of a two-semester sequence in organic chemistry designed to follow Chemistry 012A. Topics include nomenclature, stereochemistry, mechanisms, reactions, and spectroscopic studies of aliphatic and aromatic alcohols, aldehydes, ketones, acids, and other classes of organic and biological compounds (such as amino acids, proteins, and nucleic acids). Problem-solving techniques will be used to elucidate mechanistic, structural, and stereochemical features in chemical reactions. Lectures and laboratory methods will focus on synthesis, isolation, purification, elucidation, and identification of organic structures as well as instrumental methods and data interpretation.

- **3. If you have a degree or certificate, please include a diagram of your program's guided pathways program map. (A program map indicates courses suggested for each semester, across two years, upon completion a student would qualify for a degree/certificate).**

See attached files for AA-Chemistry and AS-T Chemistry program maps

- **4. Identify and describe innovative strategies or pedagogy your department/program developed/offered to maximize student learning and success. How did they impact student learning and success?**

N/A

- **5. Discuss plans for future curricular development and/or program degrees & certificates included) modification.**

N/A

- **6. Describe how your program is articulated with High School Districts, and/or other four year institutions. (Include articulation agreements, CID, ADTs...)**

At present, we have articulation agreements with other 4-year institutions allowing our students to transfer all the major Chemistry courses required to finish their B. S. degrees in Chemistry, Biochemistry, and Chemical Engineering. At present, we do not have any articulation transfer agreement with any high school. We feel that most high school chemistry courses do not offer the necessary laboratory preparation to help students succeed in more advanced chemistry courses. However, we do allow high school students who have passed the Advanced Placement (AP) Exam in Chemistry with a score of 3 or higher to skip CHEM15 (Foundations in Chemistry). They can proceed directly to CHEM1A (General Chemistry I). High school students, who have passed the Advanced Placement (AP) Exam in Chemistry with a score of 4 or higher, can bypass CHEM1A and proceed directly to CHEM1B (General Chemistry II).

- **7. If external accreditation or certification is required, please state the certifying agency and status of the program.**

N/A

## Student Learning Outcome and Assessment

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### Related Assessments

1A 201 202 FA19 SLO- Created: 01/24/2020 New Section Level SLO Assessment Report Originator: Preeti Srinivasan (/Form/Module/Index/174)

1A 201 202 FA19 SLO- Created: 01/24/2020 New Section Level SLO Assessment Report Originator: Preeti Srinivasan (/Form/Module/Index/208)

1A 201 202 FA19 SLO- Created: 01/24/2020 New Section Level SLO Assessment Report Originator: Preeti Srinivasan (/Form/Module/Index/225)

CHEM 001A General Chemistry- Created: 06/18/2020 New Section Level SLO Assessment Report Originator: Preeti Srinivasan (/Form/Module/Index/553)

CHEM 001A General Chemistry- Created: 06/26/2020 New Section Level SLO Assessment Report Originator: Preeti Srinivasan (/Form/Module/Index/562)

CHEM 001A General Chemistry- Created: 06/26/2020 New Section Level SLO Assessment Report Originator: Preeti Srinivasan (/Form/Module/Index/563)

CHEM 001A General Chemistry- Created: 06/26/2020 New Section Level SLO Assessment Report Originator: Preeti Srinivasan (/Form/Module/Index/564)

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CHEM 001B- Created: 07/28/2020 New Section Level SLO Assessment Report Originator: Charles Chau (/Form/Module/Index/640)

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CHEM 012B SLO-2- Created: 07/01/2020 New Section Level SLO Assessment Report Originator: Preeti Srinivasan (/Form/Module/Index/587)

CHEM 012B SLO-3- Created: 07/01/2020 New Section Level SLO Assessment Report Originator: Preeti Srinivasan (/Form/Module/Index/588)

CHEM 012B SLO-4- Created: 07/01/2020 New Section Level SLO Assessment Report Originator: Preeti Srinivasan (/Form/Module/Index/589)

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Fundamentals of Chemistry- Created: 06/01/2020 New Section Level SLO Assessment Report Originator: Bonnie Brown (/Form/Module/Index/510)

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Originator: Preeti Srinivasan (/Form/Module/Index/550)

CHEM 030B Introduction to Chemistry- Created: 06/18/2020 New Section Level SLO Assessment Report  
Originator: Preeti Srinivasan (/Form/Module/Index/551)

### **Student Learning Outcomes**

CHEM 001A - General Chemistry - Distinguish and describe ionic and covalent compounds; write and name chemical formulas. (Historical)

CHEM 001A - General Chemistry - Distinguish and describe ionic and covalent compounds; write and name chemical formulas. (Active)

CHEM 001A - General Chemistry - Distinguish and describe ionic and covalent compounds; write and name chemical formulas. (Active)

CHEM 001A - General Chemistry - Distinguish and describe ionic and covalent compounds; write and name chemical formulas. (Historical)

CHEM 001A - General Chemistry - Distinguish and describe ionic and covalent compounds; write and name chemical formulas. (Historical)

CHEM 001A - General Chemistry - Distinguish and describe ionic and covalent compounds; write and name chemical formulas. (Active)

CHEM 001A - General Chemistry - Distinguish and describe ionic and covalent compounds; write and name chemical formulas. (Active)

CHEM 001A - General Chemistry - Distinguish and describe ionic and covalent compounds; write and name chemical formulas. (Active)

CHEM 001A - General Chemistry - Interpret and classify chemical reactions (including redox) occurring in the macroscopic world using microscopic principles, and recognize quantitative relationships from balanced chemical equations. (Active)

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CHEM 001A - General Chemistry - Interpret and classify chemical reactions (including redox) occurring in the macroscopic world using microscopic principles, and recognize quantitative relationships from balanced chemical equations. (Historical)

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CHEM 001A - General Chemistry - Interpret and classify chemical reactions (including redox) occurring in the macroscopic world using microscopic principles, and recognize quantitative relationships from balanced chemical equations. (Active)

CHEM 001A - General Chemistry - Interpret and classify chemical reactions (including redox) occurring in the macroscopic world using microscopic principles, and recognize quantitative relationships from balanced chemical equations. (Historical)

CHEM 001A - General Chemistry - Describe gaseous behavior using the Kinetic Molecular Theory as a theoretical model and use this model to solve problems (Historical)

CHEM 001A - General Chemistry - Describe gaseous behavior using the Kinetic Molecular Theory as a theoretical model and use this model to solve problems (Active)

CHEM 001A - General Chemistry - Describe gaseous behavior using the Kinetic Molecular Theory as a theoretical model and use this model to solve problems (Active)

CHEM 001A - General Chemistry - Describe gaseous behavior using the Kinetic Molecular Theory as a theoretical model and use this model to solve problems (Historical)

CHEM 001A - General Chemistry - Describe gaseous behavior using the Kinetic Molecular Theory as a theoretical model and use this model to solve problems (Historical)

CHEM 001A - General Chemistry - Describe gaseous behavior using the Kinetic Molecular Theory as a theoretical model and use this model to solve problems (Active)

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CHEM 001A - General Chemistry - Describe gaseous behavior using the Kinetic Molecular Theory as a theoretical model and use this model to solve problems (Active)

CHEM 001A - General Chemistry - Explain the structure of atoms and periodic trends and properties using quantum and atomic theories, describe the underlying principles of covalent and ionic bond formation and molecular geometry, and correlate these principles to the reactivity and properties of liquids, solids, and solutions and their intermolecular interactions. (Active)

CHEM 001A - General Chemistry - Explain the structure of atoms and periodic trends and properties using quantum and atomic theories, describe the underlying principles of covalent and ionic bond formation and molecular geometry, and correlate these principles to the reactivity and properties of liquids, solids, and solutions and their intermolecular interactions. (Active)

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CHEM 001A - General Chemistry - Explain the structure of atoms and periodic trends and properties using quantum and atomic theories, describe the underlying principles of covalent and ionic bond formation and molecular geometry, and correlate these principles to the reactivity and properties of liquids, solids, and solutions and their intermolecular interactions. (Active)

CHEM 001A - General Chemistry - Analyze and perform macroscale and microscale experiments applying significant figures, scientific notation, statistics, and technology, including computers and the web; to calculate and analyze lab data (Active)

CHEM 001A - General Chemistry - Analyze and perform macroscale and microscale experiments applying significant figures, scientific notation, statistics, and technology, including computers and the web; to calculate and analyze lab data (Historical)

CHEM 001A - General Chemistry - Analyze and perform macroscale and microscale experiments applying significant figures, scientific notation, statistics, and technology, including computers and the web; to calculate and analyze lab data (Active)

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CHEM 001A - General Chemistry - Use thermodynamics to explain heat transfer in reactions and apply Le Chatelier's principle to predict position of equilibrium. (Active)

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CHEM 001A - General Chemistry - Use thermodynamics to explain heat transfer in reactions and apply Le Chatelier's principle to predict position of equilibrium. (Historical)

CHEM 001A - General Chemistry - Use thermodynamics to explain heat transfer in reactions and apply Le Chatelier's principle to predict position of equilibrium. (Active)

CHEM 001B - General Chemistry - Express the rate law using the initial rate study and calculate activation energy given rate vs. temperature data; recognize the relationship between the rate law and the reaction mechanism. (Rejected)

CHEM 001B - General Chemistry - Express the rate law using the initial rate study and calculate activation energy given rate vs. temperature data; recognize the relationship between the rate law and the reaction mechanism. (Active)

CHEM 001B - General Chemistry - Express the rate law using the initial rate study and calculate activation energy given rate vs. temperature data; recognize the relationship between the rate law and the reaction mechanism. (Active)

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CHEM 001B - General Chemistry - Express the rate law using the initial rate study and calculate activation energy given rate vs. temperature data; recognize the relationship between the rate law and the reaction mechanism. (Active)

CHEM 001B - General Chemistry - Recognize the concept of chemical equilibrium according to Le Chatelier's principle and apply the concept to aqueous systems such as acid-base, precipitation, and complex ions to analyze unknowns using inductive and deductive reasoning. (Active)

CHEM 001B - General Chemistry - Recognize the concept of chemical equilibrium according to Le Chatelier's principle and apply the concept to aqueous systems such as acid-base, precipitation, and complex ions to analyze unknowns using inductive and deductive reasoning. (Active)

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- CHEM 001B - General Chemistry - Recognize the concept of chemical equilibrium according to Le Chatelier's principle and apply the concept to aqueous systems such as acid-base, precipitation, and complex ions to analyze unknowns using inductive and deductive reasoning. (Historical)
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- CHEM 001B - General Chemistry - Recognize the concept of chemical equilibrium according to Le Chatelier's principle and apply the concept to aqueous systems such as acid-base, precipitation, and complex ions to analyze unknowns using inductive and deductive reasoning. (Historical)
- CHEM 001B - General Chemistry - Recognize the concept of chemical equilibrium according to Le Chatelier's principle and apply the concept to aqueous systems such as acid-base, precipitation, and complex ions to analyze unknowns using inductive and deductive reasoning. (Active)
- CHEM 001B - General Chemistry - Recognize the concept of chemical equilibrium according to Le Chatelier's principle and apply the concept to aqueous systems such as acid-base, precipitation, and complex ions to analyze unknowns using inductive and deductive reasoning. (Active)
- CHEM 001B - General Chemistry - Recognize the concept of chemical equilibrium according to Le Chatelier's principle and apply the concept to aqueous systems such as acid-base, precipitation, and complex ions to analyze unknowns using inductive and deductive reasoning. (Active)
- CHEM 001B - General Chemistry - Recognize the concept of chemical equilibrium according to Le Chatelier's principle and apply the concept to aqueous systems such as acid-base, precipitation, and complex ions to analyze unknowns using inductive and deductive reasoning. (Active)
- CHEM 001B - General Chemistry - Recognize the concept of chemical equilibrium according to Le Chatelier's principle and apply the concept to aqueous systems such as acid-base, precipitation, and complex ions to analyze unknowns using inductive and deductive reasoning. (Active)
- CHEM 001B - General Chemistry - Recognize the concept of chemical equilibrium according to Le Chatelier's principle and apply the concept to aqueous systems such as acid-base, precipitation, and complex ions to analyze unknowns using inductive and deductive reasoning. (Rejected)
- CHEM 001B - General Chemistry - Predict the spontaneity of chemical reactions using the Second Law of Thermodynamics (entropy and Gibbs free energy) and apply the Second Law of Thermodynamics to voltaic cells and electrolytic cells. (Rejected)
- CHEM 001B - General Chemistry - Predict the spontaneity of chemical reactions using the Second Law of Thermodynamics (entropy and Gibbs free energy) and apply the Second Law of Thermodynamics to voltaic cells and electrolytic cells. (Active)
- CHEM 001B - General Chemistry - Predict the spontaneity of chemical reactions using the Second Law of Thermodynamics (entropy and Gibbs free energy) and apply the Second Law of Thermodynamics to voltaic cells and electrolytic cells. (Active)
- CHEM 001B - General Chemistry - Predict the spontaneity of chemical reactions using the Second Law of Thermodynamics (entropy and Gibbs free energy) and apply the Second Law of Thermodynamics to voltaic cells and electrolytic cells. (Active)
- CHEM 001B - General Chemistry - Predict the spontaneity of chemical reactions using the Second Law of Thermodynamics (entropy and Gibbs free energy) and apply the Second Law of Thermodynamics to voltaic cells and electrolytic cells. (Active)
- CHEM 001B - General Chemistry - Predict the spontaneity of chemical reactions using the Second Law of Thermodynamics (entropy and Gibbs free energy) and apply the Second Law of Thermodynamics to voltaic cells and electrolytic cells. (Historical)
- CHEM 001B - General Chemistry - Predict the spontaneity of chemical reactions using the Second Law of Thermodynamics (entropy and Gibbs free energy) and apply the Second Law of Thermodynamics to voltaic cells and electrolytic cells. (Historical)

CHEM 001B - General Chemistry - Predict the spontaneity of chemical reactions using the Second Law of Thermodynamics (entropy and Gibbs free energy) and apply the Second Law of Thermodynamics to voltaic cells and electrolytic cells. (Historical)

CHEM 001B - General Chemistry - Predict the spontaneity of chemical reactions using the Second Law of Thermodynamics (entropy and Gibbs free energy) and apply the Second Law of Thermodynamics to voltaic cells and electrolytic cells. (Active)

CHEM 001B - General Chemistry - Predict the spontaneity of chemical reactions using the Second Law of Thermodynamics (entropy and Gibbs free energy) and apply the Second Law of Thermodynamics to voltaic cells and electrolytic cells. (Historical)

CHEM 001B - General Chemistry - Predict the spontaneity of chemical reactions using the Second Law of Thermodynamics (entropy and Gibbs free energy) and apply the Second Law of Thermodynamics to voltaic cells and electrolytic cells. (Historical)

CHEM 001B - General Chemistry - Predict the spontaneity of chemical reactions using the Second Law of Thermodynamics (entropy and Gibbs free energy) and apply the Second Law of Thermodynamics to voltaic cells and electrolytic cells. (Active)

CHEM 001B - General Chemistry - Predict the spontaneity of chemical reactions using the Second Law of Thermodynamics (entropy and Gibbs free energy) and apply the Second Law of Thermodynamics to voltaic cells and electrolytic cells. (Active)

CHEM 001B - General Chemistry - Describe the bonding theories of coordination compounds and their chemical behavior. (Active)

CHEM 001B - General Chemistry - Describe the bonding theories of coordination compounds and their chemical behavior. (Active)

CHEM 001B - General Chemistry - Describe the bonding theories of coordination compounds and their chemical behavior. (Historical)

CHEM 001B - General Chemistry - Describe the bonding theories of coordination compounds and their chemical behavior. (Historical)

CHEM 001B - General Chemistry - Describe the bonding theories of coordination compounds and their chemical behavior. (Active)

CHEM 001B - General Chemistry - Describe the bonding theories of coordination compounds and their chemical behavior. (Historical)

CHEM 001B - General Chemistry - Describe the bonding theories of coordination compounds and their chemical behavior. (Historical)

CHEM 001B - General Chemistry - Describe the bonding theories of coordination compounds and their chemical behavior. (Historical)

CHEM 001B - General Chemistry - Describe the bonding theories of coordination compounds and their chemical behavior. (Active)

CHEM 001B - General Chemistry - Describe the bonding theories of coordination compounds and their chemical behavior. (Active)

CHEM 001B - General Chemistry - Describe the bonding theories of coordination compounds and their chemical behavior. (Active)

CHEM 001B - General Chemistry - Describe the bonding theories of coordination compounds and their chemical behavior. (Active)

CHEM 001B - General Chemistry - Describe the bonding theories of coordination compounds and their chemical behavior. (Rejected)

CHEM 001B - General Chemistry - Describe nuclear disintegration processes and explain their nuclear behavior. (Rejected)

CHEM 001B - General Chemistry - Describe nuclear disintegration processes and explain their nuclear behavior. (Active)

CHEM 001B - General Chemistry - Describe nuclear disintegration processes and explain their nuclear behavior. (Active)

CHEM 001B - General Chemistry - Describe nuclear disintegration processes and explain their nuclear behavior. (Active)

CHEM 001B - General Chemistry - Describe nuclear disintegration processes and explain their nuclear behavior. (Active)

CHEM 001B - General Chemistry - Describe nuclear disintegration processes and explain their nuclear behavior. (Historical)

CHEM 001B - General Chemistry - Describe nuclear disintegration processes and explain their nuclear behavior. (Historical)

CHEM 001B - General Chemistry - Describe nuclear disintegration processes and explain their nuclear behavior. (Historical)

CHEM 001B - General Chemistry - Describe nuclear disintegration processes and explain their nuclear behavior. (Active)

CHEM 001B - General Chemistry - Describe nuclear disintegration processes and explain their nuclear behavior. (Historical)

CHEM 001B - General Chemistry - Describe nuclear disintegration processes and explain their nuclear behavior. (Historical)

CHEM 001B - General Chemistry - Describe nuclear disintegration processes and explain their nuclear behavior. (Active)

CHEM 001B - General Chemistry - Describe nuclear disintegration processes and explain their nuclear behavior. (Active)

CHEM 001B - General Chemistry - Classify organic molecules according to functional groups and structures, and summarize their main chemical reactions. (Active)

CHEM 001B - General Chemistry - Classify organic molecules according to functional groups and structures, and summarize their main chemical reactions. (Active)

CHEM 001B - General Chemistry - Classify organic molecules according to functional groups and structures, and summarize their main chemical reactions. (Historical)

CHEM 001B - General Chemistry - Classify organic molecules according to functional groups and structures, and summarize their main chemical reactions. (Historical)

CHEM 001B - General Chemistry - Classify organic molecules according to functional groups and structures, and summarize their main chemical reactions. (Active)

CHEM 001B - General Chemistry - Classify organic molecules according to functional groups and structures, and summarize their main chemical reactions. (Historical)

CHEM 001B - General Chemistry - Classify organic molecules according to functional groups and structures, and summarize their main chemical reactions. (Historical)

CHEM 001B - General Chemistry - Classify organic molecules according to functional groups and structures, and summarize their main chemical reactions. (Active)

CHEM 001B - General Chemistry - Classify organic molecules according to functional groups and structures, and summarize their main chemical reactions. (Active)

CHEM 001B - General Chemistry - Classify organic molecules according to functional groups and structures, and summarize their main chemical reactions. (Active)

CHEM 001B - General Chemistry - Classify organic molecules according to functional groups and structures, and summarize their main chemical reactions. (Active)

CHEM 001B - General Chemistry - Classify organic molecules according to functional groups and structures, and summarize their main chemical reactions. (Active)

CHEM 001B - General Chemistry - Classify organic molecules according to functional groups and structures, and summarize their main chemical reactions. (Rejected)

CHEM 012A - Organic Chemistry - Employ the scientific methods of testing, observing, and drawing conclusions through inductive and deductive reasoning (Active)

CHEM 012A - Organic Chemistry - Employ the scientific methods of testing, observing, and drawing conclusions through inductive and deductive reasoning (Historical)

CHEM 012A - Organic Chemistry - Employ the scientific methods of testing, observing, and drawing conclusions through inductive and deductive reasoning (Active)

CHEM 012A - Organic Chemistry - Employ the scientific methods of testing, observing, and drawing conclusions through inductive and deductive reasoning (Active)

CHEM 012A - Organic Chemistry - Employ the scientific methods of testing, observing, and drawing conclusions through inductive and deductive reasoning (In Review)

CHEM 012A - Organic Chemistry - Employ the scientific methods of testing, observing, and drawing conclusions through inductive and deductive reasoning (Active)

CHEM 012A - Organic Chemistry - Employ the scientific methods of testing, observing, and drawing conclusions through inductive and deductive reasoning (Historical)

CHEM 012A - Organic Chemistry - Employ the scientific methods of testing, observing, and drawing conclusions through inductive and deductive reasoning (Active)

CHEM 012A - Organic Chemistry - Employ the scientific methods of testing, observing, and drawing conclusions through inductive and deductive reasoning (Historical)

CHEM 012A - Organic Chemistry - Employ the scientific methods of testing, observing, and drawing conclusions through inductive and deductive reasoning (Historical)

CHEM 012A - Organic Chemistry - Employ the scientific methods of testing, observing, and drawing conclusions through inductive and deductive reasoning (Historical)

CHEM 012A - Organic Chemistry - Apply the 3-D nature of organic molecules to study major organic reactions including descriptions of reaction kinetics, mechanisms, and stereochemistry of products. (Historical)

CHEM 012A - Organic Chemistry - Apply the 3-D nature of organic molecules to study major organic reactions including descriptions of reaction kinetics, mechanisms, and stereochemistry of products. (Historical)

CHEM 012A - Organic Chemistry - Apply the 3-D nature of organic molecules to study major organic reactions including descriptions of reaction kinetics, mechanisms, and stereochemistry of products. (Historical)

CHEM 012A - Organic Chemistry - Apply the 3-D nature of organic molecules to study major organic reactions including descriptions of reaction kinetics, mechanisms, and stereochemistry of products. (Active)

CHEM 012A - Organic Chemistry - Apply the 3-D nature of organic molecules to study major organic reactions including descriptions of reaction kinetics, mechanisms, and stereochemistry of products. (Historical)

CHEM 012A - Organic Chemistry - Apply the 3-D nature of organic molecules to study major organic reactions including descriptions of reaction kinetics, mechanisms, and stereochemistry of products. (Active)

CHEM 012A - Organic Chemistry - Apply the 3-D nature of organic molecules to study major organic reactions including descriptions of reaction kinetics, mechanisms, and stereochemistry of products. (In Review)

CHEM 012A - Organic Chemistry - Apply the 3-D nature of organic molecules to study major organic reactions including descriptions of reaction kinetics, mechanisms, and stereochemistry of products. (Active)

CHEM 012A - Organic Chemistry - Apply the 3-D nature of organic molecules to study major organic reactions including descriptions of reaction kinetics, mechanisms, and stereochemistry of products. (Active)

CHEM 012A - Organic Chemistry - Apply the 3-D nature of organic molecules to study major organic reactions including descriptions of reaction kinetics, mechanisms, and stereochemistry of products. (Historical)

CHEM 012A - Organic Chemistry - Apply the 3-D nature of organic molecules to study major organic reactions including descriptions of reaction kinetics, mechanisms, and stereochemistry of products. (Active)

CHEM 012A - Organic Chemistry - Describe the theoretical and experimental aspects of common organic laboratory techniques for separation, purification, and compound characterization (Active)

CHEM 012A - Organic Chemistry - Describe the theoretical and experimental aspects of common organic laboratory techniques for separation, purification, and compound characterization (Historical)

CHEM 012A - Organic Chemistry - Describe the theoretical and experimental aspects of common organic laboratory techniques for separation, purification, and compound characterization (Active)

CHEM 012A - Organic Chemistry - Describe the theoretical and experimental aspects of common organic laboratory techniques for separation, purification, and compound characterization (Active)

CHEM 012A - Organic Chemistry - Describe the theoretical and experimental aspects of common organic laboratory techniques for separation, purification, and compound characterization (In Review)

CHEM 012A - Organic Chemistry - Describe the theoretical and experimental aspects of common organic laboratory techniques for separation, purification, and compound characterization (Active)

CHEM 012A - Organic Chemistry - Describe the theoretical and experimental aspects of common organic laboratory techniques for separation, purification, and compound characterization (Historical)

CHEM 012A - Organic Chemistry - Describe the theoretical and experimental aspects of common organic laboratory techniques for separation, purification, and compound characterization (Active)

CHEM 012A - Organic Chemistry - Describe the theoretical and experimental aspects of common organic laboratory techniques for separation, purification, and compound characterization (Historical)

CHEM 012A - Organic Chemistry - Describe the theoretical and experimental aspects of common organic laboratory techniques for separation, purification, and compound characterization (Historical)

CHEM 012A - Organic Chemistry - Describe the theoretical and experimental aspects of common organic laboratory techniques for separation, purification, and compound characterization (Historical)

CHEM 012A - Organic Chemistry - Compare and contrast major classes of organic compounds in their physical and chemical properties by application of bonding theories, intermolecular forces, steric, and electronic forces (Historical)

CHEM 012A - Organic Chemistry - Compare and contrast major classes of organic compounds in their physical and chemical properties by application of bonding theories, intermolecular forces, steric, and electronic forces (Historical)

CHEM 012A - Organic Chemistry - Compare and contrast major classes of organic compounds in their physical and chemical properties by application of bonding theories, intermolecular forces, steric, and electronic forces (Historical)

CHEM 012A - Organic Chemistry - Compare and contrast major classes of organic compounds in their physical and chemical properties by application of bonding theories, intermolecular forces, steric, and electronic forces (Active)

CHEM 012A - Organic Chemistry - Compare and contrast major classes of organic compounds in their physical and chemical properties by application of bonding theories, intermolecular forces, steric, and electronic forces (Historical)

CHEM 012A - Organic Chemistry - Compare and contrast major classes of organic compounds in their physical and chemical properties by application of bonding theories, intermolecular forces, steric, and electronic forces (Active)

CHEM 012A - Organic Chemistry - Compare and contrast major classes of organic compounds in their physical and chemical properties by application of bonding theories, intermolecular forces, steric, and electronic forces (In Review)

CHEM 012A - Organic Chemistry - Compare and contrast major classes of organic compounds in their physical and chemical properties by application of bonding theories, intermolecular forces, steric, and electronic forces (Active)

CHEM 012A - Organic Chemistry - Compare and contrast major classes of organic compounds in their physical and chemical properties by application of bonding theories, intermolecular forces, steric, and electronic forces (Active)

CHEM 012A - Organic Chemistry - Compare and contrast major classes of organic compounds in their physical and chemical properties by application of bonding theories, intermolecular forces, steric, and electronic forces (Historical)

CHEM 012A - Organic Chemistry - Compare and contrast major classes of organic compounds in their physical and chemical properties by application of bonding theories, intermolecular forces, steric, and electronic forces (Active)

CHEM 012A - Organic Chemistry - Apply physical spectroscopic theories and laboratory techniques for compound elucidation. (Active)

CHEM 012A - Organic Chemistry - Apply physical spectroscopic theories and laboratory techniques for compound elucidation. (Historical)

CHEM 012A - Organic Chemistry - Apply physical spectroscopic theories and laboratory techniques for compound elucidation. (Active)

CHEM 012A - Organic Chemistry - Apply physical spectroscopic theories and laboratory techniques for compound elucidation. (Active)

CHEM 012A - Organic Chemistry - Apply physical spectroscopic theories and laboratory techniques for compound elucidation. (In Review)

CHEM 012A - Organic Chemistry - Apply physical spectroscopic theories and laboratory techniques for compound elucidation. (Active)

CHEM 012A - Organic Chemistry - Apply physical spectroscopic theories and laboratory techniques for compound elucidation. (Historical)

CHEM 012A - Organic Chemistry - Apply physical spectroscopic theories and laboratory techniques for compound elucidation. (Active)

CHEM 012A - Organic Chemistry - Apply physical spectroscopic theories and laboratory techniques for compound elucidation. (Historical)

CHEM 012A - Organic Chemistry - Apply physical spectroscopic theories and laboratory techniques for compound elucidation. (Historical)

CHEM 012A - Organic Chemistry - Apply physical spectroscopic theories and laboratory techniques for compound elucidation. (Historical)

CHEM 012B - Organic Chemistry - Employ the scientific methods of testing, observing, and drawing conclusions through inductive and deductive reasoning in synthesis and spectroscopy experiments (Historical)

CHEM 012B - Organic Chemistry - Employ the scientific methods of testing, observing, and drawing conclusions through inductive and deductive reasoning in synthesis and spectroscopy experiments (Active)

CHEM 012B - Organic Chemistry - Employ the scientific methods of testing, observing, and drawing conclusions through inductive and deductive reasoning in synthesis and spectroscopy experiments (Active)

CHEM 012B - Organic Chemistry - Employ the scientific methods of testing, observing, and drawing conclusions through inductive and deductive reasoning in synthesis and spectroscopy experiments (Active)

CHEM 012B - Organic Chemistry - Employ the scientific methods of testing, observing, and drawing conclusions through inductive and deductive reasoning in synthesis and spectroscopy experiments (Active)

CHEM 012B - Organic Chemistry - Apply the 3-D nature of organic molecules to study major organic reactions for alcohols, ketones, aldehydes, carboxylic acids, and their derivatives including descriptions of reaction kinetics, mechanisms, and stereochemistry of products (Active)

CHEM 012B - Organic Chemistry - Apply the 3-D nature of organic molecules to study major organic reactions for alcohols, ketones, aldehydes, carboxylic acids, and their derivatives including descriptions of reaction kinetics, mechanisms, and stereochemistry of products (Active)

CHEM 012B - Organic Chemistry - Apply the 3-D nature of organic molecules to study major organic reactions for alcohols, ketones, aldehydes, carboxylic acids, and their derivatives including descriptions of reaction kinetics, mechanisms, and stereochemistry of products (Active)

CHEM 012B - Organic Chemistry - Apply the 3-D nature of organic molecules to study major organic reactions for alcohols, ketones, aldehydes, carboxylic acids, and their derivatives including descriptions of reaction kinetics, mechanisms, and stereochemistry of products (Active)

CHEM 012B - Organic Chemistry - Apply the 3-D nature of organic molecules to study major organic reactions for alcohols, ketones, aldehydes, carboxylic acids, and their derivatives including descriptions of reaction kinetics, mechanisms, and stereochemistry of products (Historical)

CHEM 012B - Organic Chemistry - Compare and contrast major classes of organic compounds such as alcohols, ketones, aldehydes, carboxylic acids, and their derivatives in their physical and chemical properties by application of bonding theories, intermolecular forces, steric, and electronic forces (Historical)

CHEM 012B - Organic Chemistry - Compare and contrast major classes of organic compounds such as alcohols, ketones, aldehydes, carboxylic acids, and their derivatives in their physical and chemical properties by application of bonding theories, intermolecular forces, steric, and electronic forces (Active)

CHEM 012B - Organic Chemistry - Compare and contrast major classes of organic compounds such as alcohols, ketones, aldehydes, carboxylic acids, and their derivatives in their physical and chemical properties by application of bonding theories, intermolecular forces, steric, and electronic forces (Active)

CHEM 012B - Organic Chemistry - Compare and contrast major classes of organic compounds such as alcohols, ketones, aldehydes, carboxylic acids, and their derivatives in their physical and chemical properties by application of bonding theories, intermolecular forces, steric, and electronic forces (Active)

CHEM 012B - Organic Chemistry - Compare and contrast major classes of organic compounds such as alcohols, ketones, aldehydes, carboxylic acids, and their derivatives in their physical and chemical properties by application of bonding theories, intermolecular forces, steric, and electronic forces (Active)

CHEM 012B - Organic Chemistry - Apply physical spectroscopic theories and laboratory techniques for compound elucidation including alcohols, ketones, aldehydes, carboxylic acids, and their derivatives (Active)

CHEM 012B - Organic Chemistry - Apply physical spectroscopic theories and laboratory techniques for compound elucidation including alcohols, ketones, aldehydes, carboxylic acids, and their derivatives (Active)

CHEM 012B - Organic Chemistry - Apply physical spectroscopic theories and laboratory techniques for compound elucidation including alcohols, ketones, aldehydes, carboxylic acids, and their derivatives (Active)

CHEM 012B - Organic Chemistry - Apply physical spectroscopic theories and laboratory techniques for compound elucidation including alcohols, ketones, aldehydes, carboxylic acids, and their derivatives (Active)

CHEM 012B - Organic Chemistry - Apply physical spectroscopic theories and laboratory techniques for compound elucidation including alcohols, ketones, aldehydes, carboxylic acids, and their derivatives (Historical)

CHEM 012B - Organic Chemistry - Relate organic reactions of functional groups in the design and synthesis of more complex systems including polyesters, polyamides, and polypeptides (Historical)

CHEM 012B - Organic Chemistry - Relate organic reactions of functional groups in the design and synthesis of more complex systems including polyesters, polyamides, and polypeptides (Active)

CHEM 012B - Organic Chemistry - Relate organic reactions of functional groups in the design and synthesis of more complex systems including polyesters, polyamides, and polypeptides (Active)

CHEM 012B - Organic Chemistry - Relate organic reactions of functional groups in the design and synthesis of more complex systems including polyesters, polyamides, and polypeptides (Active)

CHEM 012B - Organic Chemistry - Relate organic reactions of functional groups in the design and synthesis of more complex systems including polyesters, polyamides, and polypeptides (Active)

CHEM 015 - Fundamentals of Chemistry - Apply safety rules learned in lab to safely conduct lab operations and present laboratory data using graphing and precision of data with simple statistics. (Active)

CHEM 015 - Fundamentals of Chemistry - Apply safety rules learned in lab to safely conduct lab operations and present laboratory data using graphing and precision of data with simple statistics. (Active)

CHEM 015 - Fundamentals of Chemistry - Apply safety rules learned in lab to safely conduct lab operations and present laboratory data using graphing and precision of data with simple statistics. (Historical)

CHEM 015 - Fundamentals of Chemistry - Apply safety rules learned in lab to safely conduct lab operations and present laboratory data using graphing and precision of data with simple statistics. (Active)

CHEM 015 - Fundamentals of Chemistry - Apply safety rules learned in lab to safely conduct lab operations and present laboratory data using graphing and precision of data with simple statistics. (Historical)

CHEM 015 - Fundamentals of Chemistry - Apply safety rules learned in lab to safely conduct lab operations and present laboratory data using graphing and precision of data with simple statistics. (Historical)

CHEM 015 - Fundamentals of Chemistry - Apply safety rules learned in lab to safely conduct lab operations and present laboratory data using graphing and precision of data with simple statistics. (Active)

CHEM 015 - Fundamentals of Chemistry - Apply safety rules learned in lab to safely conduct lab operations and present laboratory data using graphing and precision of data with simple statistics. (Active)

CHEM 015 - Fundamentals of Chemistry - Apply safety rules learned in lab to safely conduct lab operations and present laboratory data using graphing and precision of data with simple statistics. (Historical)

CHEM 015 - Fundamentals of Chemistry - Apply safety rules learned in lab to safely conduct lab operations and present laboratory data using graphing and precision of data with simple statistics. (Active)

CHEM 015 - Fundamentals of Chemistry - Distinguish between elements and compounds, their physical and chemical properties, along with ionic and covalent compounds and the writing of their names and formulas. (Active)

CHEM 015 - Fundamentals of Chemistry - Distinguish between elements and compounds, their physical and chemical properties, along with ionic and covalent compounds and the writing of their names and formulas. (Historical)

CHEM 015 - Fundamentals of Chemistry - Distinguish between elements and compounds, their physical and chemical properties, along with ionic and covalent compounds and the writing of their names and formulas. (Active)

CHEM 015 - Fundamentals of Chemistry - Distinguish between elements and compounds, their physical and chemical properties, along with ionic and covalent compounds and the writing of their names and formulas. (Active)

CHEM 015 - Fundamentals of Chemistry - Distinguish between elements and compounds, their physical and chemical properties, along with ionic and covalent compounds and the writing of their names and formulas. (Historical)

CHEM 015 - Fundamentals of Chemistry - Distinguish between elements and compounds, their physical and chemical properties, along with ionic and covalent compounds and the writing of their names and formulas. (Historical)

CHEM 015 - Fundamentals of Chemistry - Distinguish between elements and compounds, their physical and chemical properties, along with ionic and covalent compounds and the writing of their names and formulas. (Active)

CHEM 015 - Fundamentals of Chemistry - Distinguish between elements and compounds, their physical and chemical properties, along with ionic and covalent compounds and the writing of their names and formulas. (Historical)

CHEM 015 - Fundamentals of Chemistry - Distinguish between elements and compounds, their physical and chemical properties, along with ionic and covalent compounds and the writing of their names and formulas. (Active)

CHEM 015 - Fundamentals of Chemistry - Distinguish between elements and compounds, their physical and chemical properties, along with ionic and covalent compounds and the writing of their names and formulas. (Active)

CHEM 015 - Fundamentals of Chemistry - Describe the internal structure of atoms using subatomic particles; the meaning of nuclear symbols for isotopes while predicting the nature of chemical bonds and molecular polarity from the periodicity of the elements. (Active)

CHEM 015 - Fundamentals of Chemistry - Describe the internal structure of atoms using subatomic particles; the meaning of nuclear symbols for isotopes while predicting the nature of chemical bonds and molecular polarity from the periodicity of the elements. (Active)

CHEM 015 - Fundamentals of Chemistry - Describe the internal structure of atoms using subatomic particles; the meaning of nuclear symbols for isotopes while predicting the nature of chemical bonds and molecular polarity from the periodicity of the elements. (Historical)

CHEM 015 - Fundamentals of Chemistry - Describe the internal structure of atoms using subatomic particles; the meaning of nuclear symbols for isotopes while predicting the nature of chemical bonds and molecular polarity from the periodicity of the elements. (Active)

CHEM 015 - Fundamentals of Chemistry - Describe the internal structure of atoms using subatomic particles; the meaning of nuclear symbols for isotopes while predicting the nature of chemical bonds and molecular polarity from the periodicity of the elements. (Historical)

CHEM 015 - Fundamentals of Chemistry - Describe the internal structure of atoms using subatomic particles; the meaning of nuclear symbols for isotopes while predicting the nature of chemical bonds and molecular polarity from the periodicity of the elements. (Historical)

CHEM 015 - Fundamentals of Chemistry - Describe the internal structure of atoms using subatomic particles; the meaning of nuclear symbols for isotopes while predicting the nature of chemical bonds and molecular polarity from the periodicity of the elements. (Active)

CHEM 015 - Fundamentals of Chemistry - Describe the internal structure of atoms using subatomic particles; the meaning of nuclear symbols for isotopes while predicting the nature of chemical bonds and molecular polarity from the periodicity of the elements. (Active)

CHEM 015 - Fundamentals of Chemistry - Describe the internal structure of atoms using subatomic particles; the meaning of nuclear symbols for isotopes while predicting the nature of chemical bonds and molecular polarity from the periodicity of the elements. (Historical)

CHEM 015 - Fundamentals of Chemistry - Describe the internal structure of atoms using subatomic particles; the meaning of nuclear symbols for isotopes while predicting the nature of chemical bonds and molecular polarity from the periodicity of the elements. (Active)

CHEM 015 - Fundamentals of Chemistry - Explain the concepts of chemical stoichiometry at both the macroscopic and particulate level while applying these concepts to solving chemical reaction problems from real-world information and predicting products of simple chemical reaction types. (Active)

CHEM 015 - Fundamentals of Chemistry - Explain the concepts of chemical stoichiometry at both the macroscopic and particulate level while applying these concepts to solving chemical reaction problems from real-world information and predicting products of simple chemical reaction types. (Historical)

CHEM 015 - Fundamentals of Chemistry - Explain the concepts of chemical stoichiometry at both the macroscopic and particulate level while applying these concepts to solving chemical reaction problems from real-world information and predicting products of simple chemical reaction types. (Active)

CHEM 015 - Fundamentals of Chemistry - Explain the concepts of chemical stoichiometry at both the macroscopic and particulate level while applying these concepts to solving chemical reaction problems from real-world information and predicting products of simple chemical reaction types. (Active)

CHEM 015 - Fundamentals of Chemistry - Explain the concepts of chemical stoichiometry at both the macroscopic and particulate level while applying these concepts to solving chemical reaction problems from real-world information and predicting products of simple chemical reaction types. (Historical)

CHEM 015 - Fundamentals of Chemistry - Explain the concepts of chemical stoichiometry at both the macroscopic and particulate level while applying these concepts to solving chemical reaction problems from real-world information and predicting products of simple chemical reaction types. (Historical)

CHEM 015 - Fundamentals of Chemistry - Explain the concepts of chemical stoichiometry at both the macroscopic and particulate level while applying these concepts to solving chemical reaction problems from real-world information and predicting products of simple chemical reaction types. (Active)

CHEM 015 - Fundamentals of Chemistry - Explain the concepts of chemical stoichiometry at both the macroscopic and particulate level while applying these concepts to solving chemical reaction problems from real-world information and predicting products of simple chemical reaction types. (Historical)

CHEM 015 - Fundamentals of Chemistry - Explain the concepts of chemical stoichiometry at both the macroscopic and particulate level while applying these concepts to solving chemical reaction problems from real-world information and predicting products of simple chemical reaction types. (Active)

CHEM 015 - Fundamentals of Chemistry - Explain the concepts of chemical stoichiometry at both the macroscopic and particulate level while applying these concepts to solving chemical reaction problems from real-world information and predicting products of simple chemical reaction types. (Active)

CHEM 015 - Fundamentals of Chemistry - Explain gas behavior using macroscopic properties and microscopic molecular dynamics and solve problems of gases using the combined gas law and ideal gas law. (Active)

CHEM 015 - Fundamentals of Chemistry - Explain gas behavior using macroscopic properties and microscopic molecular dynamics and solve problems of gases using the combined gas law and ideal gas law. (Active)

CHEM 015 - Fundamentals of Chemistry - Explain gas behavior using macroscopic properties and microscopic molecular dynamics and solve problems of gases using the combined gas law and ideal gas law. (Historical)

CHEM 015 - Fundamentals of Chemistry - Explain gas behavior using macroscopic properties and microscopic molecular dynamics and solve problems of gases using the combined gas law and ideal gas law. (Active)

CHEM 015 - Fundamentals of Chemistry - Explain gas behavior using macroscopic properties and microscopic molecular dynamics and solve problems of gases using the combined gas law and ideal gas law. (Historical)

CHEM 015 - Fundamentals of Chemistry - Explain gas behavior using macroscopic properties and microscopic molecular dynamics and solve problems of gases using the combined gas law and ideal gas law. (Historical)

CHEM 015 - Fundamentals of Chemistry - Explain gas behavior using macroscopic properties and microscopic molecular dynamics and solve problems of gases using the combined gas law and ideal gas law. (Active)

CHEM 015 - Fundamentals of Chemistry - Explain gas behavior using macroscopic properties and microscopic molecular dynamics and solve problems of gases using the combined gas law and ideal gas law. (Active)

CHEM 015 - Fundamentals of Chemistry - Explain gas behavior using macroscopic properties and microscopic molecular dynamics and solve problems of gases using the combined gas law and ideal gas law. (Historical)

CHEM 015 - Fundamentals of Chemistry - Explain gas behavior using macroscopic properties and microscopic molecular dynamics and solve problems of gases using the combined gas law and ideal gas law. (Active)

CHEM 015 - Fundamentals of Chemistry - Explain how liquids, solids and solution behavior can be understood using intermolecular dynamics and modified kinetic molecular theory, and solve solution concentration problems along with explaining acid-base reactions, electrolytic behavior, and performing pH and titration calculations. (Active)

CHEM 015 - Fundamentals of Chemistry - Explain how liquids, solids and solution behavior can be understood using intermolecular dynamics and modified kinetic molecular theory, and solve solution concentration problems along with explaining acid-base reactions, electrolytic behavior, and performing pH and titration calculations. (Historical)

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CHEM 030B - Introduction to Chemistry - Distinguish and compare the chemical and physical properties associated with the various classes, functional groups, and biochemical types of organic compounds. (CC1-9; CO1,2) (Historical)

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CHEM 030B - Introduction to Chemistry - Recognize, interpret, and write simple reactions for different organic functional groups. (CC1-7; CO1) (Active)

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CHEM 030B - Introduction to Chemistry - Recognize, interpret, and write simple reactions for different organic functional groups. (CC1-7; CO1) (Historical)

CHEM 030B - Introduction to Chemistry - Interpret the effect of structure and isomerism on a molecule's physical properties and its importance in organic chemistry. (CC1; CO1) (Historical)

CHEM 030B - Introduction to Chemistry - Interpret the effect of structure and isomerism on a molecule's physical properties and its importance in organic chemistry. (CC1; CO1) (Active)

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CHEM 030B - Introduction to Chemistry - Interpret the effect of structure and isomerism on a molecule's physical properties and its importance in organic chemistry. (CC1; CO1) (Active)

CHEM 030B - Introduction to Chemistry - Describe the functions in living systems of various biochemical substances such as carbohydrates, lipids, proteins, and biopolymers. (CC1, CC7-10; CO2) (Active)

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CHEM 030B - Introduction to Chemistry - Describe the functions in living systems of various biochemical substances such as carbohydrates, lipids, proteins, and biopolymers. (CC1, CC7-10; CO2) (Historical)

CHEM 030B - Introduction to Chemistry - Describe the three-dimensional structures of biomolecules and recognize the relationships between the structure and function of these molecules. (CC7-10; CO2,4) (Historical)

CHEM 030B - Introduction to Chemistry - Describe the three-dimensional structures of biomolecules and recognize the relationships between the structure and function of these molecules. (CC7-10; CO2,4) (Active)

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CHEM 030B - Introduction to Chemistry - Describe the three-dimensional structures of biomolecules and recognize the relationships between the structure and function of these molecules. (CC7-10; CO2,4) (Active)

CHEM 030B - Introduction to Chemistry - Describe some important biological processes such as enzymatic regulation, hormonal regulation, nucleic acid synthesis, and selected metabolic pathways. (CC11; CO3,4)

(Active)

CHEM 030B - Introduction to Chemistry - Describe some important biological processes such as enzymatic regulation, hormonal regulation, nucleic acid synthesis, and selected metabolic pathways. (CC11; CO3,4)

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(Historical)

### Program Learning Outcomes

- 1. On the program level, defined as a course of study leading to degree or certificate, list the Program Learning Outcomes (PLOs), and how they relate to the GE/ILOs. Please also indicate how the course SLOs have been mapped to the PLOs. If you are completing this program review as a department or discipline and do not offer any degrees or certificates, please write N/A in this space.**

#### CHEM AA degree:

1. Perform technical work in diverse careers, such as health sciences, engineering, industrial chemistry, pharmacy, materials science, and teaching, that require technical knowledge in chemistry/biochemistry (ILOs - Communication, Inquiry and Reasoning, Information Competency, Social Responsibility, Personal Development). Courses mapped: CHEM 001A, CHEM 001B, CHEM 012A, CHEM 012B, MATH 071, MATH 072
2. Apply scientific methodologies and math skills, communicate effectively, and think critically. (ILOs - Inquiry and Reasoning, Information Competency, Social Responsibility, Personal Development). Courses mapped: CHEM 001A, CHEM 001B, CHEM 012A, CHEM 012B, MATH 071, MATH 072
3. Demonstrate competence in lab techniques and chemical experimental methods. (ILOs - Communication, Inquiry and Reasoning, Information Competency, Personal Development) Courses mapped: CHEM 012A, CHEM 012B, MATH 072

#### CHEM AS-T degree:

1. Apply analytical methodologies with logical quantitative and qualitative reasoning when approaching a chemical problem. (ILOs - Communication, Inquiry and Reasoning, Information Competency, Social Responsibility, Personal Development). Courses mapped: CHEM 001A, CHEM 001B, CHEM 012A, CHEM 012B, MATH 066, MATH 067

2. Demonstrate competence in laboratory techniques and chemical experimental methods. (ILOs - Communication, Inquiry and Reasoning, Information Competency, Social Responsibility, Personal Development). Courses mapped: CHEM 001A, CHEM 001B, CHEM 012A, CHEM 012B, MATH 066, MATH 067
3. Recognize the processes which explain natural chemical phenomena. (ILOs - Communication, Inquiry and Reasoning, Information Competency, Social Responsibility, Personal Development) Courses mapped: CHEM 001A, CHEM 001B, CHEM 012A, CHEM 012B, MATH 066, MATH 067

Foundational Chemistry Certificate:

1. Perform basic and complex calculations related to the preparation of solutions, as well as the skills to prepare chemical solutions. (ILOs - Communication, Inquiry and Reasoning, Information Competency, Personal Development) (Courses mapped: CHEM 001A, CHEM 001B, CHEM 012A, CHEM 012B)
  2. Follow experimental protocols involving the uses of standard and analytical equipment, materials, and techniques employed in general, organic and analytical chemistry laboratory. (ILOs - Communication, Inquiry and Reasoning, Information Competency, Social Responsibility, Personal Development) (Courses mapped: CHEM 001A, CHEM 001B, CHEM 012A, CHEM 012B)
  3. Carry out quantitative and qualitative analyses in experiments. (ILOs - Communication, Inquiry and Reasoning, Information Competency, Social Responsibility, Personal Development) (Courses mapped: CHEM 001A, CHEM 001B, CHEM 012A, CHEM 012B)
  4. Function independently or with a team on experimental lab assignments that involve scientific methods. (ILOs - Communication, Inquiry and Reasoning, Information Competency, Social Responsibility, Personal Development) (Courses mapped: CHEM 001A, CHEM 001B, CHEM 012A, CHEM 012B)
- **2. Since your last program review, summarize SLO assessment activities and results at the course and program level. Please include dialogue regarding SLO Assessment results with division/department/college colleagues and/or GE areas. Provide evidence of the dialogue (i.e. department meeting minutes or division meeting minutes, etc.) List any SLOs or PLOs that have not been assessed in the last two years and provide an explanation of why they have not been assessed. This will be reviewed by the IEC to determine if your Program Review is approved or not.**

As of November 29, 2022, all SLO assessments are up to date for all the chemistry courses. (Please see attached file "CHEM SLO Status 29 Nov 2022".)

As of September 12, 2022, all PLO assessments are up to date for the AA, AS-T, and Foundational Chemistry Certificate programs. (Please see attached files "CHEM PLO Status 12 Sep 2022 for all three chemistry programs.)

For our course SLO assessments, the lead instructor for each course creates a common set of questions (summative and formative) for use in assessment of SLOs across multiple sections of the course, that may be taught by different instructors. Assessments may be collected from lab activities,

lab quizzes, midterm exams, or the final exam, as per the needs of the SLO. All the SLOs for a course are assessed and analyzed over the course of a 2 year cycle. The loop is closed by determining necessary resources and intervention.

In the 2016-17 and 2018-2019 two-year assessment cycles, overall averages on the SLOs for all courses in the programs ranged broadly from 55% to 85%. During the 2020-21 two-year cycle, overall, most (70-89%) of the students have mastered the competency of the SLOs for each course listed here and thus the selected PLO. A few assessments in this cycle were done in Spring 2021 which was during the COVID-19 pandemic, i.e. students were in a remote online learning environment via synchronous zoom, lecture recordings, with remotely proctored open-book exams, and virtual labs. Other assessments were determined in Fall 2021, where hands-on labs were in-person, lectures were via synchronous zoom with class recordings, and exams were conducted face-to-face.

In the Spring 2021 semester, lectures were remote-synchronous online. It is difficult to compare these results with those of previous years (pre-pandemic) since this assessment was done using an open-book exam format during the COVID pandemic. In the pre-pandemic years, traditional classroom exams were closed books and in-person. Another aspect to consider is that with the synchronous zoom modality, lectures were recorded. This allows students to review the recorded lectures before each exam, and could potentially enhance their learning. In addition, the online format made it much easier to arrange review sessions that seem to have increased student understanding of the key concepts. Experiments were conducted via virtual lab simulations and video recordings of experiments conducted by the instructor to gather data for students to analyze. The average lab report score was excellent, but it is not a real measure of hands-on skills required for this degree major. However, Fall 2021 SLO results were more consistent with previous years when students did organic chemistry labs and lectures were both live-streamed and in-person, and exams were face-to-face in-person in a closed book format.

- **3. What plans for improvement have been implemented to your courses or program as a result of SLO assessment? Please share one or two success stories about the impacts of SLO assessment on student learning.**

CHEM AA degree: Embedded tutoring and extra practice study sessions might be useful. Also, the remote synchronous online modality showed that students might have been learning better since the lectures were recorded (as for all these courses). This way, the students could review all the lectures before each exam. In addition, the online format made it much easier to arrange review sessions and student participation in online office hours also improved. The school should continue to allow all students to borrow laptops. The laboratory laptops and Spartan software need an immediate update, since the program runs very slowly otherwise. Funding to provide additional laboratory chemicals and apparatus (such as melting/boiling point apparatus, metal die sets for KBr pellet preparation, NMR apparatus etc.) for students to run experiments independently and to not have to work in pairs. Laboratory chemicals (especially organic chemistry) are very expensive. The goal is to have enough resources for students to be able to work independently and improve their critical thinking and hands-on skills.

CHEM AS-T degree: Embedded tutoring and extra practice study sessions might be useful. Also, the remote synchronous online modality showed that students might have been learning better since the lectures were recorded (as for all these courses). This way, the students could review all the lectures before each exam. In addition, the online format made it much easier to arrange review sessions and student participation in online office hours also improved. The school should continue to allow all

students to borrow laptops. The laboratory laptops and Spartan software need an immediate update, since the program runs very slowly otherwise. Math courses need a new computer lab in order to test mathematical models. Funding to provide additional laboratory chemicals and apparatus (such as melting/boiling point apparatus, metal die sets for KBr pellet preparation, NMR apparatus etc.) for students to run experiments independently and to not have to work in pairs. Laboratory chemicals (especially organic chemistry) are very expensive. The goal is to have enough resources for students to be able to work independently and improve their critical thinking and hands-on skills.

Foundational Chemistry Certificate: Embedded tutoring and extra practice study sessions would be useful. Also, the remote synchronous online modality showed that students might have been learning better since the lectures were recorded and posted later in the LMS. This way, the students could review the lecture content before each exam. In addition, student participation improved with online office hours. The school should continue to allow all students to borrow laptops. The laboratory laptops and Spartan software need an immediate update, since the program runs very slowly otherwise. Lab skills is an essential component of this certificate program, that would allow these students to join the workforce. Thus, providing sufficient funding for laboratory apparatus, equipment, and chemicals for students to work independently is a top priority.

## Faculty and Staff

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### Part D: Faculty and Staff

- **1. List current faculty and staff members in the program, areas of expertise, and describe how their positions contribute to the success of the program.**

The current full-time faculty and staff of the chemistry department are: Bonnie Brown (Faculty), Preeti Srinivasan (Faculty), Charles Chau (Faculty), Michael Ghebream (Faculty), Vu Tran (Staff), and Van Duong (Staff).

Bonnie C. Brown, Chemistry Faculty

Education: B.S., Tuskegee Institute; M.S., San Jose State University

Areas of Expertise: Physical Chemistry with a Master of Science in Chemistry. Taught chemistry at Evergreen Valley College and several other San Francisco Bay Area institutions as a lecturer to promote excellence and equity for all students.

How Does My Position Contribute to Program Success?

- Provides a positive impact to foster education and encourage students in investigating scientific query while improving their lives and the greater society.
- Provides service to working students and students unable to attend day classes for Chemistry 030A, 015, 01A and 01B with evening offerings and summer offerings.
- Provides a more diverse community by participation as an Affirm instructor.
- Fosters a respect for cultural diversity through collaborative research project which promotes and develops writing skills.
- Serve as a mentor to students through guidance for higher education, internship programs and employment.
- Implemented the AS-T degree for Chemistry in 2019.

## Professional Memberships

- Membership in American Chemical Society(ACS)
- ACS Two-Year College Chemistry Consortium (2YC3)

Preeti Srinivasan, Ph.D., Chemistry Faculty

Education: Ph.D. (Medicinal Chemistry), University of Kansas, Lawrence

Areas of Expertise: Medicinal Chemistry, Organic Chemistry and Synthesis, Analytical Chemistry, Physical and Physical Organic Chemistry, Biochemistry, Drug Design, Spectroscopy and Instrumentation, Laboratory Techniques, Radiation Safety Protocols, and Online learning pedagogues. Dr. Srinivasan worked for over 5 years in the biotechnology and pharmaceutical industry on research in drug design, discovery, and development before starting her career in teaching. The courses she has taught include Introductory Chemistry, General Chemistry, Organic Chemistry, and Chemistry for Biotechnology majors.

How Does My Position Contribute to Program Success?

- In the classroom, she focuses on her students' content learning and technical expertise, critical thinking and problem-solving, to ensure that they are competent with their peers, across the board. In addition to imparting them content knowledge, she works on the development of the whole person and helps students build their core abilities, identify personal, educational, and career goals as well as make satisfying decisions for transition to the workforce as productive members of society.
- Assists in student guidance and tutoring in the Math Science Resource Center.
- Serving as a research advisor to students in the honors program
- Assist in the operation and safety in laboratories, help in laboratory equipment set up and data acquisition and analysis.
- Participated in the Evergreen Valley College Chapter's yearly Society for the Advancement of Chicanos and Native Americans in Science (SACNAS) Outreach Conference. The purpose of this conference is to familiarize high school students with college life, and expose them to the different career options in math, science, and engineering.
- Serving as a member of the EVC Academic Senate since August 2014.
- Participated in the College's annual Day of the Green: Freshman Orientation for new, first-time college students matriculating from local area high schools. This event is designed to introduce students and their parents to the college campus and provide opportunities for them to learn about resources for academic and personal success.
- Participates in screening committees for hiring science faculty and laboratory personnel.
- Currently serving on the Division Curriculum Committee and Division Council.
- Continue to serve on the tenure review committees for tenure-track Chemistry and Biology faculty.
- Completed and received Peer Online Course Review (POCR) certification and is part of the local EVC POCR team reviewing campus distance-education courses for eligibility.

Charles M. Chau, Chemistry Faculty

Education: Ph.D. (Biochemistry), Loma Linda University, Loma Linda, CA.

Areas of Expertise: Biochemistry, virology, and cancer.

### How Does My Position Contribute to Program Success?

- Serve as one of the main faculty instructors for various chemistry courses.
- Serve as a mentor to students in the honors program at EVC who wish to conduct an independent Honors project.
- Participates in various Chemistry department activities, such as Program Review, faculty evaluation, faculty hiring, SLO assessments, course curriculum review, etc.
- Served on the Institutional Effective Committee. Currently serving in the Division Curriculum Committee, the Division Council, and the Academic Senate.

### Professional Memberships

- Membership in American Chemical Society (ACS)
- ACS Two-Year College Chemistry Consortium (2YC3)
- National Science Teachers Association (NSTA)
- CA Community College System's C-ID Reviewer (Chemistry)
- American Association for the Advancement of Science (AAAS)

Michael B. Ghebreab, Chemistry Faculty

Education: Ph.D. (Chemistry), University of Vermont, Burlington, VT

Areas of Expertise: Organometallic Catalysis and Phosphorus Chemistry

### How Does My Position Contribute to Program Success?

- Serve as one of the instructors for chemistry courses that are integrated with academic special programs such as Affirm.
- Participate in various chemistry department activities such as faculty evaluations, SLO assessments, faculty evaluations, etc.
- Provides a more diverse community by participation as an Affirm instructor and mentor.
- Participate in Open Educational Resources Initiative (OERI) Webinars, California Community Colleges Webinars and Events.
- Participated in EVC Educators Taking Action: Humanizing Curriculum and Instructions to improve students' success and retention by disrupting the disparities in traditionally underrepresented students on our campus.

### Professional Memberships

- Membership in the American Chemical Society(ACS)
  - ACS Two-Year College Chemistry Consortium (2YC3)
- **2. In addition to major professional development activities completed by faculty and staff in the past, in particular with regards to students' success, equity, distance education, SLO assessment, guided pathways and/or innovative teaching/learning strategies, are there any additional professional development needs of your department in the future? What are they? Please provide details about a timeline.**

With the changing educational landscape (hastened by the COVID-19 pandemic) and the changing demographics in the San Jose area, the chemistry department anticipates a number of professional development needs. We recognize the impetus of the state of California to improve upon our student success rates across all racial and ethnic groups. Our goals are: (1) To improve chemistry faculty

participation in community outreach programs, (2) to ensure that our faculty are representative of our diverse student populations, and (3) to ensure that our courses address the needs of all of our diverse student populations (low-cost and zero-cost textbook programs).

Timeline: We hope to implement the above stated goals at the beginning of Spring 2023. We hope to reach 25% low-cost or zero-cost textbook chemistry sections by the Spring of 2025.

Since the COVID-19 pandemic, there is a recognition that our chemistry department must adapt to the increasing popularity of distance education. To offer distance education without sacrificing quality, we anticipate that all current and future chemistry instructors would need to continuously participate in professional development courses geared towards enhancing distance education. The courses could be in online teaching methodologies or online teaching technologies. Timeline: Currently, the chemistry department only offers one section of CHEM30B as a hybrid course. As we begin to offer more "hybrid" courses (starting in Summer 2023 with the addition of "hybrid" CHEM30A), we anticipate the need for more professional development in distance education at that time and beyond.

## Budget Planning

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### Part E: Budget Planning

- **1. With your Dean, review the department Fund 10 budget (operational budget) and discuss the adequacy of the budget in meeting the program's needs.**

Currently, the chemistry department's annual budget is only \$8000. This is through Fund 17. The chemistry department does not have a Fund 10 budget. From Fund 17, the chemistry department only had two major equipment purchases. This was in 2018 for the purchase of a gas chromatography (GC) instrument and an infrared spectroscopy (FT-IR) instrument.

From 2017 to 2021, most of the chemistry department's budget allocation of \$8,000 was used to pay for services (such as the deionized water system). As such, we did not have enough funds to resupply many of our chemical and lab supply needs. The Division often allocated extra money to help meet these needs.

During this cycle, our program has expanded to include the AS-T program and the Foundational Chemistry Certificate program. We would like to request an annual Fund 17 budget of **\$30,100+** **/year** to buy instructional materials to run all our labs in our Chemistry programs.

During this cycle, we will also be requesting a Fund 10 budget of \$33,000 for maintenance of equipment (such as GC/MS and FT-IR) and facilities - such as deionized water.

We have also included this budget proposal for Fund 17 and Fund 10 in the new Resource Allocation Request section as well.

To conclude, the Chemistry department has expanded in the last 6 years from 1 degree program to 2 degrees and 1 certificate program. Many of the 4-year universities that our students transfer to require that the full sequence of coursework be completed at the same college. For e.g. CHEM 001A and CHEM 001B or CHEM 012A and CHEM 012B. Students who typically start CHEM 001A in the Fall of a given academic year (for e.g. 2021) hope to complete the 4-chemistry course sequence (CHEM 001A-001B-012A-012B) in the Spring semester of the following academic year (that is, 2023), so that they can transfer as juniors to the 4-year university. To be able to keep them on target with this transfer path, we have to open up additional sections for our courses (like we are doing for CHEM

012B in Spring 2023). Adding a section comes with adding to our Chemistry lab needs such as glassware, chemicals, equipment, lab technicians, etc. It is our continued request for a Fund 10 budget allocation that will provide sustainable funding support of our Chemistry labs.

- **2. List all external funds, i.e. fund 17, the department/program receives, and describe their primary use.**

We received a one-time seed fund for creating the Foundational Chemistry Certificate program. However, most of this grant was used to buy supplies to set up the labs since we do not have sufficient funds from our annual chemistry department budget to meet our needs. We continue to request additional funding to sustain this certificate program.

## Technology and Equipment

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### Part F: Technology and Equipment

- **Review the current department technology and equipment needed and assess program adequacy. List and changes to technology or equipment since the last program review. If changes were made please indicate how the change impacted student success.**

With the conversion of some sections of CHEM30A and CHEM15 to hybrid modalities, we anticipate a need to improve our technology and equipment for distance education modalities. Most CHEM30A and some CHEM15 sections are taught by our part-time faculty. As such, we would like to replace the old computers and monitors in our labs (in the MS3 Building, 2nd floor) with newer computers and "drawing monitors" that will serve two dual functions: 1) to improve the quality of lab presentations when students are attending in-person labs, and 2) to be used by our part-time (and full-time) faculty when they are teaching online courses and need a technology (high equality computer and drawing monitor) area to do high-quality, online lectures.

The use of newer computers and "drawing" monitors to improve lab presentations will result in improved student focus during labs. The overall result would be improved student learning, student retention, and student success rates.

## Additional Information

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### Part G: Additional Information

- **Please provide any other pertinent information about the program that these questions did not give you an opportunity to answer.**

## Future Needs and Resource Allocation Request

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Based on the areas noted below, please indicate any unmet needs for the program to maintain or build over the next Comprehensive Review. Please provide rationale on how the request connects back to SLO/PLO assessment, strategic initiatives or student success. If no additional requests are needed in any of the areas, put N/A.

1. **Classified Professional Request**

**Ongoing Budget Needs**

A full-time Instructional Lab Technician III, for second shift (2pm - 10PM) to support evening classes; \$95,000 annually (salary + benefits)

**One-Time Expenditure**

**Total Expenses (Staffing and Faculty Requests include Salary and Benefits)**

**Request linked to SLO/PLO #**

PLO#1 and 3 in AA-Chem, PLO#1 and 2 in AS-T Chem, PLO#2 and 3 in Chemistry Certificate

**Strategic Initiatives (student centered, organizational transformation, community engagement)**

Yes

**Improving student success rates**

Yes

**Achievement of program set standard for student success**

Yes

2. **Technology**

**Ongoing Budget Needs**

8 computers (1 for the FTIR instrument in the organic chemistry CHEM 012A, 012B labs, 7 for setup of the new uv-vis spectrophotometers for CHEM 001B)

**One-Time Expenditure**

\$8000

**Request linked to SLO/PLO #**

PLO#1 and 3 in AA-Chem, PLO#1 and 2 in AS-T Chem, PLO#2 and 3 in Chem Certificate

**Strategic Initiatives (student centered, organizational transformation, community engagement)**

Yes

**Improving student success rates**

Yes

**Achievement of program set standard for student success**

Yes

3. **Equipment/Supplies**

**Ongoing Budget Needs**

10 additional melting point apparatus for Organic Chemistry CHEM 012A and 012B labs

**One-Time Expenditure**

\$18000

**Request linked to SLO/PLO #**

PLO#1 and 3 for AA-Chem, PLO#1 and 2 for AS-T Chem, PLO#2 and 3 for Chemistry certificate

**Strategic Initiatives (student centered, organizational transformation, community engagement)**

Yes

**Improving student success rates**

Yes

**Achievement of program set standard for student success**

Yes

4. **Equipment/Supplies****Ongoing Budget Needs**

14 pH meters for CHEM 001B

**One-Time Expenditure**

\$12600

**Request linked to SLO/PLO #**

PLO#1 and 3 for AA-Chem, PLO#1 and 2 for AS-T Chem, PLO#2 and 3 for Chemistry certificate

**Strategic Initiatives (student centered, organizational transformation, community engagement)**

Yes

**Improving student success rates**

Yes

**Achievement of program set standard for student success**

Yes

5. **Equipment/Supplies****Ongoing Budget Needs**

30 new laptops to replace the old laptops that run the Spartan software for the CHEM 001A lab

**One-Time Expenditure**

\$30,000

**Request linked to SLO/PLO #**

PLO#1 in AA; PLO#1 and 2 in AS-T

**Strategic Initiatives (student centered, organizational transformation, community engagement)**

Yes

**Improving student success rates**

Yes

**Achievement of program set standard for student success**

Yes

6. **Facilities****Ongoing Budget Needs**

\$2000 (for analytical balances, NMR in preparation for repairs)

**One-Time Expenditure****Request linked to SLO/PLO #**

PLO#1 and 3 in AA-Chem, PLO#1 and 2 in AS-T Chem, PLO#2 and 3 in Chemistry Certificate

**Strategic Initiatives (student centered, organizational transformation, community engagement)**

Yes

**Improving student success rates**

Yes

**Achievement of program set standard for student success**

Yes

**7. Facilities****Ongoing Budget Needs**

\$7,000 for Maintenance of FTIR (Perkin-Elmer)

**One-Time Expenditure****Request linked to SLO/PLO #**

PLO#1 and 3 for AA-Chem, PLO#1 and 2 for AS-T Chem, PLO#2 and 3 for Chemistry certificate

**Strategic Initiatives (student centered, organizational transformation, community engagement)**

Yes

**Improving student success rates**

Yes

**Achievement of program set standard for student success**

Yes

**8. Facilities****Ongoing Budget Needs**

\$18,500 for maintenance of the GC-MS (Agilent Technologies)

**One-Time Expenditure****Request linked to SLO/PLO #**

PLO#1 and 3 for AA-Chem, PLO#1 and 2 for AS-T Chem, PLO#2 and 3 for Chemistry certificate

**Strategic Initiatives (student centered, organizational transformation, community engagement)**

Yes

**Improving student success rates**

Yes

**Achievement of program set standard for student success**

Yes

**9. Facilities****Ongoing Budget Needs**

\$7500 for maintenance of the deionized water system (Evoqua)

**One-Time Expenditure****Request linked to SLO/PLO #**

PLO#1 and 3 for AA-Chem, PLO#1 and 2 for AS-T Chem, PLO#2 and 3 for Chemistry certificate

**Strategic Initiatives (student centered, organizational transformation, community engagement)**

Yes

**Improving student success rates**

Yes

**Achievement of program set standard for student success**

Yes

**10. Equipment/Supplies****Ongoing Budget Needs**

\$6000, CHEM 012A & 012B, 6 sections (Fall, Spring)

**One-Time Expenditure**

**Request linked to SLO/PLO #**

PLO#1 and 3 for AA-Chem, PLO#1 and 2 for AS-T Chem, PLO#2 and 3 for Chemistry certificate

**Strategic Initiatives (student centered, organizational transformation, community engagement)**

Yes

**Improving student success rates**

Yes

**Achievement of program set standard for student success**

Yes

11. **Equipment/Supplies****Ongoing Budget Needs**

\$4,800, CHEM 001A, 8 sections (Fall, Spring, Summer)

**One-Time Expenditure****Request linked to SLO/PLO #**

PLO#1 and 3 for AA-Chem, PLO#1 and 2 for AS-T Chem, PLO#2 and 3 for Chemistry certificate

**Strategic Initiatives (student centered, organizational transformation, community engagement)**

Yes

**Improving student success rates**

Yes

**Achievement of program set standard for student success**

Yes

12. **Equipment/Supplies****Ongoing Budget Needs**

\$2400, CHEM 001B, 4 sections (Fall, Spring)

**One-Time Expenditure****Request linked to SLO/PLO #**

PLO#1 and 3 for AA-Chem, PLO#1 and 2 for AS-T Chem, PLO#2 and 3 for Chemistry certificate

**Strategic Initiatives (student centered, organizational transformation, community engagement)**

Yes

**Improving student success rates**

Yes

**Achievement of program set standard for student success**

Yes

13. **Equipment/Supplies****Ongoing Budget Needs**

\$10,500, CHEM 030A, 21 sections (Fall, Spring, Summer)

**One-Time Expenditure****Request linked to SLO/PLO #**

PLO#1 and 3 for AA-Chem, PLO#1 and 2 for AS-T Chem, PLO#2 and 3 for Chemistry certificate

**Strategic Initiatives (student centered, organizational transformation, community engagement)**

Yes

**Improving student success rates**

Yes

**Achievement of program set standard for student success**

Yes

14. **Equipment/Supplies****Ongoing Budget Needs**

\$5,200, CHEM 015, 13 sections (Fall, Spring, Summer)

**One-Time Expenditure****Request linked to SLO/PLO #**

PLO#1 and 3 for AA-Chem, PLO#1 and 2 for AS-T Chem, PLO#2 and 3 for Chemistry certificate

**Strategic Initiatives (student centered, organizational transformation, community engagement)**

Yes

**Improving student success rates**

Yes

**Achievement of program set standard for student success**

Yes

15. **Equipment/Supplies****Ongoing Budget Needs**

\$1200, CHEM 030B, 2 sections (Fall, Spring)

**One-Time Expenditure****Request linked to SLO/PLO #**

PLO#1 and 3 for AA-Chem, PLO#1 and 2 for AS-T Chem, PLO#2 and 3 for Chemistry certificate

**Strategic Initiatives (student centered, organizational transformation, community engagement)**

Yes

**Improving student success rates**

Yes

**Achievement of program set standard for student success**

Yes

16. **Facilities****Ongoing Budget Needs**

Need for moving the current location of the Acacia AC162 chemistry lab to MS3 since it presents a hazardous concern and violates safety practices. As per the history of the MS3 building construction, the lab was intended to be transferred over from Acacia and that is why plumbing and electrical layout are already piped-in. See attached file of the supporting resolution passed by the EVC Academic Senate in 2018

**One-Time Expenditure**

\$500,000+

**Request linked to SLO/PLO #**

PLO#1 and 3 for AA-Chem, PLO#1 and 2 for AS-T Chem, PLO#2 and 3 for Chemistry certificate

**Strategic Initiatives (student centered, organizational transformation, community engagement)**

Yes

**Improving student success rates**

Yes

**Achievement of program set standard for student success**

Yes

17. **Technology****Ongoing Budget Needs**

Replacing computers and monitors in two lecture rooms and five lab rooms in Chemistry

**One-Time Expenditure**

\$16,100

**Request linked to SLO/PLO #**

PLO#1 and 3 in AA-Chem, PLO#1 and 2 in AS-T Chem, PLO#2 and 3 in Chem Certificate

**Strategic Initiatives (student centered, organizational transformation, community engagement)**

Yes

**Improving student success rates**

Yes

**Achievement of program set standard for student success**

Yes

18. **Facilities****Ongoing Budget Needs**

\$2800 for maintenance service of glassware washing machine

**One-Time Expenditure****Request linked to SLO/PLO #**

PLO#1 and 3 in AA-Chem, PLO#1 and 2 in AS-T Chem, PLO#2 and 3 in Chemistry Certificate

**Strategic Initiatives (student centered, organizational transformation, community engagement)**

Yes

**Improving student success rates**

Yes

**Achievement of program set standard for student success**

Yes

19. **Equipment/Supplies****Ongoing Budget Needs**

New glassware washing machine

**One-Time Expenditure**

\$15,000

**Request linked to SLO/PLO #**

PLO#1 and 3 in AA-Chem, PLO#1 and 2 in AS-T Chem, PLO#2 and 3 in Chemistry Certificate

**Strategic Initiatives (student centered, organizational transformation, community engagement)**

Yes

**Improving student success rates**

Yes

**Achievement of program set standard for student success**

Yes

**Total Cost**Classified Professional Request

Ongoing Budget Needs: A full-time Instructional Lab Technician III, for second shift (2pm - 10PM) to support evening classes; \$95,000 annually (salary + benefits)

One-Time Expenditure:

Total Expenses (Staffing and Faculty Requests include Salary and Benefits):

Technology

Ongoing Budget Needs: 8 computers (1 for the FTIR instrument in the organic chemistry CHEM 012A, 012B labs, 7 for setup of the new uv-vis spectrophotometers for CHEM 001B)

One-Time Expenditure: \$8000

Total Expenses (Staffing and Faculty Requests include Salary and Benefits):

Equipment/Supplies

Ongoing Budget Needs: 10 additional melting point apparatus for Organic Chemistry CHEM 012A and 012B labs

One-Time Expenditure: \$18000

Total Expenses (Staffing and Faculty Requests include Salary and Benefits):

Equipment/Supplies

Ongoing Budget Needs: 14 pH meters for CHEM 001B

One-Time Expenditure: \$12600

Total Expenses (Staffing and Faculty Requests include Salary and Benefits):

Equipment/Supplies

Ongoing Budget Needs: 30 new laptops to replace the old laptops that run the Spartan software for the CHEM 001A lab

One-Time Expenditure: \$30,000

Total Expenses (Staffing and Faculty Requests include Salary and Benefits):

Facilities

Ongoing Budget Needs: \$2000 (for analytical balances, NMR in preparation for repairs)

One-Time Expenditure:

Total Expenses (Staffing and Faculty Requests include Salary and Benefits):

Facilities

Ongoing Budget Needs: \$7,000 for Maintenance of FTIR (Perkin-Elmer)

One-Time Expenditure:

Total Expenses (Staffing and Faculty Requests include Salary and Benefits):

Facilities

Ongoing Budget Needs: \$18,500 for maintenance of the GC-MS (Agilent Technologies)

One-Time Expenditure:

Total Expenses (Staffing and Faculty Requests include Salary and Benefits):

Facilities

Ongoing Budget Needs: \$7500 for maintenance of the deionized water system (Evoqua)

One-Time Expenditure:

Total Expenses (Staffing and Faculty Requests include Salary and Benefits):

Equipment/Supplies

Ongoing Budget Needs: \$6000, CHEM 012A & 012B, 6 sections (Fall, Spring)

One-Time Expenditure:

Total Expenses (Staffing and Faculty Requests include Salary and Benefits):

Equipment/Supplies

Ongoing Budget Needs: \$4,800, CHEM 001A, 8 sections (Fall, Spring, Summer)

One-Time Expenditure:

Total Expenses (Staffing and Faculty Requests include Salary and Benefits):

Equipment/Supplies

Ongoing Budget Needs: \$2400, CHEM 001B, 4 sections (Fall, Spring)

One-Time Expenditure:

Total Expenses (Staffing and Faculty Requests include Salary and Benefits):

Equipment/Supplies

Ongoing Budget Needs: \$10,500, CHEM 030A, 21 sections (Fall, Spring, Summer)

One-Time Expenditure:

Total Expenses (Staffing and Faculty Requests include Salary and Benefits):

Equipment/Supplies

Ongoing Budget Needs: \$5,200, CHEM 015, 13 sections (Fall, Spring, Summer)

One-Time Expenditure:

Total Expenses (Staffing and Faculty Requests include Salary and Benefits):

Equipment/Supplies

Ongoing Budget Needs: \$1200, CHEM 030B, 2 sections (Fall, Spring)

One-Time Expenditure:

Total Expenses (Staffing and Faculty Requests include Salary and Benefits):

Facilities

Ongoing Budget Needs: Need for moving the current location of the Acacia AC162 chemistry lab to MS3 since it presents a hazardous concern and violates safety practices. As per the history of the MS3 building construction, the lab was intended to be transferred over from Acacia and that is why plumbing and electrical layout are already piped-in. See attached file of the supporting resolution passed by the EVC Academic Senate in 2018

One-Time Expenditure: \$500,000+

Total Expenses (Staffing and Faculty Requests include Salary and Benefits):

Technology

Ongoing Budget Needs: Replacing computers and monitors in two lecture rooms and five lab rooms in Chemistry

One-Time Expenditure: \$16,100

Total Expenses (Staffing and Faculty Requests include Salary and Benefits):

Facilities

Ongoing Budget Needs: \$2800 for maintenance service of glassware washing machine

One-Time Expenditure:

Total Expenses (Staffing and Faculty Requests include Salary and Benefits):

Equipment/Supplies

Ongoing Budget Needs: New glassware washing machine

One-Time Expenditure: \$15,000

Total Expenses (Staffing and Faculty Requests include Salary and Benefits):

## Attach Files

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Attached File

Program\_Map\_Chemistry\_AST.pdf (/Form/Module/\_DownloadFile/2777/43425?fileId=262)

Program\_Map\_Chemistry\_AA.pdf (/Form/Module/\_DownloadFile/2777/43425?fileId=263)

Resolution in Support of an Additional Chemistry and Physics Labs in MS3.pdf  
(/Form/Module/\_DownloadFile/2777/43425?fileId=302)

CHEM SLO Status 29 Nov 2022.xlsx (/Form/Module/\_DownloadFile/2777/43425?fileId=303)

AA-PLO.pdf (/Form/Module/\_DownloadFile/2777/43425?fileId=304)

AS-T PLO.pdf (/Form/Module/\_DownloadFile/2777/43425?fileId=305)

Foundational Chemistry Certificate PLO.pdf (/Form/Module/\_DownloadFile/2777/43425?fileId=306)

## IEC Reviewers

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### **IEC Mentor**

Fahmida Fakhruddin

### **IEC Second Reader**

Robert Brown