



**Division of Health, Natural Sciences & Human
Services**

**Chemistry Department
Program Review
2018-2019**

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1. Overview of the Program

A. Program Description

The mission of the Chemistry Department at Compton College (CC) is to prepare students with knowledge and skills to pursue further education in the chemical, physical, and health sciences. Students learn to engage in scientific inquiry, problem solving, and are actively engaged in their learning. The goals and mission of the department align with the mission of the college, which is to offer a quality, comprehensive educational program with supplementary student support services which aim to ensure the educational and professional success of the students in our diverse community.

The Chemistry Department offers four courses: Chemistry 4 (Beginning Chemistry), Chemistry 1A (General Chemistry I), Chemistry 1B (General Chemistry II), and Chemistry 20 (Fundamentals of Chemistry). Chemistry 4 is a preparatory course for the beginning of the lower division chemistry classes. Chemistry 1A/B is a year-long general chemistry series for STEM majors. Chemistry 20 is for students who plan to obtain an associate's degree in nursing (ADN), an allied health certificate, or transfer to a bachelor's or master's degree in nursing, or other health related degree programs. Currently, the Chemistry Department does not offer any degrees or certificates.

All the courses offered at CC fulfill the general education requirements for physical science with a laboratory and are transferable to the University of California and California State University Systems. Students taking chemistry at CC consists of an average of 65 % female, 22 % African American, and 61 % Latino. The majority of the students, 57.9 % are within the ages of 17-24, 16.5% are within 25-29 years old, and 13.9 % are within the ages of 30-39. About 75.6 % of the students are part-time students with 62 % taking their classes in the daytime.

As of February 2018, the Chemistry Department has three full-time tenure track faculty and seven adjunct instructors. The Chemistry faculty actively participates in campus-wide and division committees and activities, such as the Curriculum Committee. The faculty also meets to discuss the improvement of teaching strategies and incorporate technology in the classroom. The Chemistry department also participates and will continue to participate in the assessment of Students Learning Objectives (SLOs) and Program Level Objectives (PLOs), as well as program review and program planning. The findings from the assessments of the SLOs and PLOs help the faculty to make changes to teaching strategies accordingly, in order to improve the students' learning. The Chemistry department continuously evaluates the curriculum and the relevance of courses through program review and planning to comply with the college's strategic initiatives 1, 2, 3 and 4.

The Chemistry faculty at CC engages students to actively participate in their learning by using a variety of instructional methods and services to promote student success and create a positive learning environment, as well as a sense of community. Our faculty members completed the Faculty Inquiry Partnership Program (FIPP) and On-Course Training. Faculty members use various active learning methods to engage students. For example, students participate in peer teaching, group presentations, and various class activities. The laboratory experiments are designed to be performed in pairs (or groups) as well as individually for the students to learn a sense of belonging and most importantly to learn how to work collaboratively. Additionally, some of the sections of Chemistry

20, 4, and in the past 1A have assigned Supplemental Instruction (SI) Coaches that work specifically with the students enrolled in these courses to help them succeed in the class. The quality and variety of educational services provided for the Chemistry students match the college's mission and strategic initiatives 1, 2, and 3.

B. Previous Recommendations

Recommendation: Offer a hybrid course for Chemistry 4.

Status: This recommendation has not been pursued. The Chemistry faculty has concentrated their efforts in expanding the face-to-face Chemistry courses for STEM majors.

Recommendation: Increase the budget to buy and maintain the equipment needed to expand and offer more general chemistry courses.

Status: This recommendation has been completed. Since the last Program Review, the Chemistry Department has purchased the necessary equipment to increase our course offerings. We currently offer two sections of Chemistry 1A, one section of Chemistry 1B, and three sections of Chemistry 4. Every semester we ensure that any needed equipment is purchased and all laboratory equipment are properly maintained.

Recommendation: Increase the sections offered.

Status: This recommendation has been completed. We are excited that we have been able to expand our program and respond to the student demands by offering more sections and courses. Currently we offer six sections of Chemistry 20, three sections of Chemistry 4, two sections of Chemistry 1A, and one section of Chemistry 1B. This has been possible by scheduling the lecture of some of these sections in another room in the Math and Science Building and in the Tartar Village.

Recommendation: Increase the courses offered for science and engineering majors, specifically Chemistry 1B and Organic Chemistry.

Status: This recommendation has been partially completed. We are offering more sections of Chemistry 1A and one section of Chemistry 1B every semester. Because of the limited space and inadequate laboratory space to teach Organic Chemistry we are unable to offer Chemistry 7A and 7B at this moment. We hope the college will make good its promise to provide additional lab space for the department soon.

2. Analysis of Research Data

a) Head count of students in the program

Our student population is primarily female (65.3% in fall 2016), Latino (61%) and between the ages of 25-29, as summarized in the tables below for fall and spring semesters. The male and female average head count of 32.1% and 68%, respectively, is close to overall male and female Compton student population of 36% and 64%, respectively. The head count in the fall terms increased by 27% from 2013 to 2016. Interestingly, we saw an almost equal increase, of 25%, in the male student population in the same year span. Even though the majority of our student body is female, we have seen a decrease of about 9.5% in the female population. There was no overall change in the student headcount for the spring semesters from 2013 to 2017. We did observe an approximately 11% increase in the male student body and a small drop of 4.6% in the female head count. More than half of the department's population is Latino/a, with about 20% African American, and about 10% Asian.

Table 1. Fall Terms Student Headcounts

Fall Terms 2013-2016					Compton Student Population	
		Term				
		2013	2014	2015	2016	Fall 2016
Term Headcount		245	274	281	311	7,701
Gender	F	72.2%	70.4%	67.3%	65.3%	63.4%
	M	27.8%	29.6%	32.7%	34.7%	36.2%
Ethnicity	African-American	29.4%	21.9%	16.7%	21.5%	34.6%
	Amer. Ind. or Alask. Native	0.0%	0.0%	0.4%	0.0%	0.2%
	Asian	12.7%	12.0%	12.8%	8.0%	4.7%
	Latino	47.8%	55.1%	61.6%	61.4%	53.7%
	Pacific Islander	0.8%	0.0%	0.4%	0.3%	0.7%
	White	4.9%	6.6%	4.6%	4.8%	2.9%
	Two or More	3.7%	4.4%	2.8%	3.9%	2.7%
	Unknown or Decline	0.8%	0.0%	0.7%	0.0%	0.5%
Age/ Age Group	<17	0.0%	0.0%	0.0%	0.0%	0.6%
	17	0.8%	0.4%	0.0%	0.0%	2.2%
	18	4.1%	3.3%	4.3%	1.9%	7.5%
	19	8.6%	7.3%	11.4%	11.3%	9.2%
	20	11.8%	13.5%	13.2%	13.5%	9.8%
	21	10.2%	13.5%	10.7%	12.2%	9.5%
	22	10.6%	7.7%	7.1%	6.4%	7.5%
	23	4.1%	5.8%	6.4%	8.0%	6.3%

	24	5.3%	9.9%	6.4%	6.4%	5.9%
	25-29	19.2%	22.3%	18.9%	21.5%	16.5%
	30-39	17.1%	12.0%	14.2%	11.6%	13.9%
	40-49	5.7%	3.6%	5.7%	6.1%	6.5%
	50-64	2.4%	0.7%	1.8%	1.0%	3.6%
	65+	0.0%	0.0%	0.0%	0.0%	0.4%
Class Load	Full-time	25.7%	22.3%	23.8%	25.7%	25.5%
	Part-time	74.3%	77.7%	76.2%	74.3%	73.3%
Academic Level	College degree	16.3%	15.7%	16.7%	14.8%	10.0%
	HS Grad	81.2%	80.7%	80.8%	81.4%	81.6%
	Not a HS Grad	0.8%	0.0%	0.0%	0.6%	0.4%
	K-12 Special Admit	0.4%	0.4%	0.0%	0.0%	2.1%
	Unknown	1.2%	3.3%	2.5%	3.2%	5.9%
Educational Goal	Intend to Transfer	30.6%	34.3%	43.8%	50.5%	31.6%
	Degree/Certificate Only	6.5%	6.6%	6.4%	4.5%	7.6%
	Retrain/recertif.	2.0%	3.6%	5.7%	6.8%	3.8%
	Basic Skills/GED	4.5%	6.6%	4.6%	4.2%	6.8%
	Enrichment	3.7%	2.6%	2.5%	3.9%	1.7%
	Undecided	13.9%	12.0%	16.4%	15.4%	1.3%
	Unstated	38.8%	34.3%	20.6%	14.8%	34.1%

Overall, our students attend college part-time (~74%). There was a 9.4% increase in part-time students over the last four years. This percentage is very similar to the overall percentage of part-time students (73%) in the entire campus (table 2). The students at the Chemistry Department have a higher intent to transfer than the average Compton Student Population. Fifty percent of the Chemistry students have indicated that their goal is to transfer to a four-year college/university. This increase might be because we are offering more Chemistry courses required in the STEM majors (i.e., Chemistry 1A and 1B) than previous years. These courses are usually taken by students that will need to transfer to a four-year college to complete their degree. The increase in the STEM geared courses might also contribute to the increase in the number of male students taking Chemistry as the sciences and engineering are still predominately male dominated fields.

Table 2. SpringTerms Student Headcounts

Spring Terms 2014-2017					Compton Student Population
	Term				
	2014	2015	2016	2017	Spring 2017
Term Headcount	275	277	309	276	6,944

Gender	F	70.2%	67.5%	67.0%	67.0%	64.1%
	M	29.8%	32.5%	33.0%	33.0%	35.9%
Ethnicity	African-American	24.4%	14.8%	21.7%	20.7%	32.5%
	Amer. Ind. or Alask. Native	0.4%	0.4%	0.0%	0.4%	0.2%
	Asian	13.1%	14.8%	12.9%	12.7%	5.0%
	Latino	51.3%	60.3%	57.9%	55.4%	55.2%
	Pacific Islander	0.7%	0.0%	0.0%	0.0%	0.7%
	White	5.8%	4.7%	5.8%	6.2%	3.0%
	Two or More	3.6%	4.0%	1.6%	4.3%	2.8%
	Unknown or Decline	0.7%	1.1%	0.0%	0.4%	0.5%
Age/ Age Group	<17	0.0%	0.0%	0.0%	0.7%	0.9%
	17	0.4%	0.4%	0.0%	0.4%	1.4%
	18	4.7%	7.9%	7.8%	4.3%	6.0%
	19	7.6%	8.7%	8.4%	6.5%	8.4%
	20	11.3%	8.3%	10.0%	14.1%	9.1%
	21	11.3%	10.5%	9.1%	12.0%	8.2%
	22	9.8%	9.7%	9.7%	8.7%	7.4%
	23	8.7%	9.7%	7.1%	6.5%	6.3%
	24	6.5%	7.2%	6.1%	5.1%	5.1%
	25-29	21.1%	23.8%	23.9%	22.5%	16.1%
	30-39	13.1%	9.0%	10.7%	14.9%	12.8%
	40-49	3.3%	4.3%	5.8%	2.9%	6.2%
	50-64	2.2%	0.4%	1.3%	1.4%	3.9%
	65+	0.0%	0.0%	0.0%	0.0%	0.4%
Class Load	Full-time	25.8%	25.3%	28.2%	18.8%	23.4%
	Part-time	74.2%	74.7%	71.8%	81.2%	71.5%
Academic Level	College degree	18.2%	10.5%	18.8%	18.8%	9.9%
	HS Grad	79.6%	85.6%	78.0%	78.6%	81.5%
	Not a HS Grad	0.7%	0.0%	0.3%	0.0%	3.1%
	K-12 Special Admit	0.4%	0.0%	0.0%	0.7%	2.8%
	Unknown	1.1%	4.0%	2.9%	1.8%	4.8%
Educational Goal	Intend to Transfer	30.9%	35.4%	49.2%	50.0%	31.7%
	Degree/Certificate Only	7.3%	4.3%	7.1%	6.9%	7.3%
	Retrain/recertif.	0.7%	4.7%	3.6%	5.1%	4.4%
	Basic Skills/GED	6.2%	5.4%	4.2%	6.9%	5.8%
	Enrichment	4.4%	2.5%	2.6%	3.6%	1.6%
	Undecided	17.8%	18.4%	16.2%	16.7%	13.6%
	Unstated	32.7%	29.2%	17.2%	10.9%	26.8%

b) Course grade distribution

Table 3 below shows the grade distributions for Chemistry 20, 21A, 21B, 4, and 1A from 2013 to 2017. The grade distributions are analyzed by not including the withdrawals (“W”) or dropped (“DR”) grades. On average, about 82% of the students enrolled in Chemistry 20 passed with a grade of ‘C’ or better within these last four years. About 76% of Chemistry 21A students passed the course in 2013 and 100% of Chemistry 21B students passed with a grade of ‘C’ or better.

Table 3. Grade Distribution

Year	COURSE	Method	We	Grade I												Total	Succ.	Reten.
				'A'	'B'	'C'	'P'	'D'	'F'	'NP'	Inc P	Inc NP	'DR'	'W'				
2013	CHEM-20	Lecture	16	40	36	31		19	10		-	-		47	183	58.5%	74.3%	
	CHEM-21A	Lecture	16	8	3	2		2	2		-	-		9	26	50.0%	65.4%	
	CHEM-4	Lecture	16	6	13	4		2	1		-	-		10	36	63.9%	72.2%	
2013 Total				54	52	37		23	13		-	-		66	245	58.4%	73.1%	
2014	CHEM-1A	Lecture	16	2	10	5		1	1		2	-		8	29	65.5%	72.4%	
	CHEM-20	Lecture	16	61	85	84		23	45		-	1		74	373	61.7%	80.2%	
	CHEM-21B	Lecture	16	6	2	1					-	-		9	100.0%	100.0%		
	CHEM-4	Lecture	16	26	41	27		14	11		-	-		19	138	68.1%	86.2%	
2014 Total				95	138	117		38	57		2	1		101	549	64.1%	81.6%	
2015	CHEM-1A	Lecture	16	15	14	12		1	2		-	-		16	60	68.3%	73.3%	
	CHEM-20	Lecture	16	78	94	73		22	37		-	-		61	365	67.1%	83.3%	
	CHEM-4	Lecture	16	25	37	30		8	11		-	-		22	133	69.2%	83.5%	
2015 Total				118	145	115		31	50		-	-		99	558	67.7%	82.3%	
2016	CHEM-1A	Lecture	16	18	26	12			1		-	-		6	63	88.9%	90.5%	
	CHEM-20	Lecture	16	91	106	72		13	29		-	-		49	360	74.7%	86.4%	
	CHEM-4	Lecture	16	38	62	36		6	17		-	-		38	197	69.0%	80.7%	
2016 Total				147	194	120		19	47		-	-		93	620	74.4%	85.0%	
2017	CHEM-1A	Lecture	16	11	9	4		1	1		-	-		3	29	82.8%	89.7%	
	CHEM-20	Lecture	16	59	33	26		8	11		-	-		28	165	71.5%	83.0%	
	CHEM-4	Lecture	16	25	13	18		2	11		-	-		13	82	68.3%	84.1%	
2017 Total				95	55	48		11	23		-	-		44	276	71.7%	84.1%	

The average success rate for Chemistry 4 is 83% and amazingly 91% for Chemistry 1A. The high success rates of all of the Chemistry courses implies that the Chemistry staff is serving its students well and is assisting our students in their success and educational goals. We hope that with the addition of a third full-time, tenure-track faculty that it will increase the success rate for all of the Chemistry courses to over 82% for the next Program Review. We have observed in previous years that students receive more consistent and better quality education when the faculty is full-time, in part because full-time faculty have dedicated office hours and it is perhaps more invested in the success of the students. One strategy that we can change to achieve a higher success rate can also be hiring more Supplemental Instruction Coaches for as many sections as possible. There is a direct correlation between higher retention and success rates when students have an SI coach.

The tables above also show that Chemistry 20 has the highest withdrawal rate than any other chemistry course. This may be in part because the students in this class tend to be the least college-prepared from all of the Chemistry courses offered. The faculty has noticed that Chemistry 20 students struggle with the mathematical skills necessary to successfully complete the class. The course is one of the most demanding requirements for the health-allied majors from the science courses area. The faculty has also observed, however, that having a Supplemental Instructor greatly increases the success rate and lowers the withdrawal rate.

c) Success rates

The data in the Table 4 shows the Program Success Standard, 66.4%, and the 5-year Program Success Average of 69.4%. The success rate is defined as a student completing the course with grade of 'C' or better compared to the total number of grades; including those who withdrew or dropped the course after census date. Chemistry courses are generally demanding. Success in chemistry is dependent on several factors, but depends strongly on the preparation before class. One main factor contributing to the current low success rate is the lack of basic skills. In order to pass chemistry, students need to be able to read at a college level, have good comprehension and critical thinking skills, and apply basic math skills. From observations of several faculty members, many of the students have poor critical, comprehension and math skills. It was observed in a study reported in the department's previous program review that a strong math background leads to higher success rates in chemistry; specifically in Chemistry 20. Most of our students do not have the adequate mathematical preparation to successfully apply the mathematical concepts to solve problems in chemistry.

Table 4. Program Success Standard

Program Success Standard*	66.4%
5-year Program Success Average	69.4%

*Calculated as the average between the 5-year average and the lowest yearly rate in the 5-year period.

Chemistry is also a very highly time dependent course. For example, Chemistry 1A is a 5-unit course, in which more than 15 chapters are covered in a semester. Therefore, success is also dependent on the preparation and review after each class meeting. Most of our students, more than 70%, are part-time students who have other obligations, such as part-time or full-time jobs and family. Thus, it is hard for students to find the time to study outside of class. Instructors provide suggestions and resources to students to effectively study and set time to study.

Even though, the Chemistry Department has a rather low program success standard rate from fall 2103 to spring 2017, there was a 23% increase in the success rate (see Table 5). One of the reason for the increased success rate is improved teaching strategies and services; which are focused not only in assisting the students to do well in chemistry, but also in improving their overall study skills and habits. The instructions are focused in cooperative learning activities such as peer reviews and group presentations. The number of SI coaches has, on average, increased over the last three years. The SI coach works closely with the faculty to help students with study strategies, course content and academic development. For example, about 72% of the SI participants passed the class with a 'C' or better in Chemistry 20.

Table 5. Success Rate

Year	Total Grades	Success Rate
FA 2013	245	58.4%
2014	549	64.1%
2015	558	67.7%
2016	620	74.4%
SP 2017	276	71.7%

To continue to improve the success rate in Chemistry, it is important to provide student resources such as in-person tutoring. There is a Chemistry tutor available at the Learning Resource Center each day, including Saturdays. Additionally, students that are part of the MESA program, have accessed to special workshops and/or tutoring in Chemistry 4, 1A and 1B courses to help them study more efficiently and succeed.

Table 6 below summarizes the demographic success rate for the fall semesters. There was an overall increase in the success rate for African American, Latinos, Asians and White students, with the highest increase for African American students. The success rate increased by 77% for African Americans from fall 2013 to fall 2016. We have also seen an increase in the success rate of both male and female students. The greatest overall change was for female students; their success rate increased by about 40% from fall 2013 to fall 2016. The male population improved by about 18%. These rates increases are seen through the College. In general, male students tend to have a more difficult time succeeding in College. The Department still needs to make a concerted effort to find other strategies and methods to help our students to be more successful and improve the success rates across the board. For both terms, our most successful students are those in the age groups between 25-49 and 19 years or younger.

Table 6. Fall Term Demographic Success (2013-2016)

<i>Ethnicity</i>	Fall 2013		Fall 2014		Fall 2015		Fall 2016	
	Success	N	Success	N	Success	N	Success	N
African-American	38.9%	72	53.3%	60	66.0%	47	68.7%	67
Amer. Ind. or Alask. Native	0.0%	X	0.0%	X	100.0%	X	0.0%	X
Asian	83.9%	31	75.8%	33	72.2%	36	84.0%	25
Latino	63.2%	117	50.3%	151	65.9%	173	79.1%	191
Pacific Islander	0.0%	X	0.0%	X	100.0%	X	100.0%	X
Two or More	77.8%	X	58.3%	12	75.0%	X	75.0%	12
Unknown or Decline	50.0%	X	0.0%	X	50.0%	X	0.0%	X
White	58.3%	12	83.3%	18	84.6%	13	80.0%	15
<i>Gender</i>								
M	58.8%	68	65.4%	81	72.8%	92	69.4%	108
F	58.2%	177	52.8%	193	65.6%	189	81.3%	203
X	0.0%	X	0.0%	X	0.0%	X	0.0%	X
<i>Age Groups</i>								
19 or less	66.7%	33	63.3%	30	59.1%	44	80.5%	41
20 to 24	60.2%	103	50.0%	138	72.4%	123	73.1%	145
25 to 49	54.4%	103	62.5%	104	67.0%	109	80.3%	122
Over 49	50.0%	X	100.0%	X	60.0%	X	100.0%	X
X: Counts are suppressed for groups with less than 10 students.								
Shaded regions indicate groups achieving at a rate less than 80% of the reference group, respectively. Reference groups are White, male, and 20 to 24 years old.								

Though the students in the Chemistry Department are succeeding, there were some areas where the success rate for demographic groups was lower than 80% of the reference group (white males between the ages of 20 to 24), in particular, amongst African Americans and Latinos. The faculty have also observed that the students do not come with the necessary mathematics/labortatory/science skills (especially those taking Chem 1A and 1B). However, these performance gaps appear across all disciplines in the college, and the methods of addressing them are not unique to chemistry. In addition to the available student resources that the college provides, chemistry instructors encourage students to take advantage of programs available on campus, such as FYE, and free tutoring six days a week. The department also plans to pursue review sessions online through Canvas. Furthermore, the faculty is currently working with some publishers to assist in building online tutoring and review services. We hope that it can be available at a reduced price or nominal fee.

The spring term demographic success rates are tabulated below (see Table 7). There was almost no change in the demographic success rates across the board for African American, Latinos, and Asians students. For three of the four years, between spring 2014 and 2017, the success rates for African Americas was below the 80% reference group.

Table 7. Spring Term Demographic Success (2014-2017)

<i>Ethnicity</i>	Spring 2014		Spring 2015		Spring 2016		Spring 2017	
	Success	N	Success	N	Success	N	Success	N
African-American	64.2%	67	48.8%	41	58.2%	67	56.1%	57
Amer. Ind. or Alask. Native	100.0%	X	100.0%	X	0.0%	X	0.0%	X
Asian	91.7%	36	90.2%	41	90.0%	40	85.7%	35
Latino	69.5%	141	64.7%	167	73.2%	179	75.2%	153
Pacific Islander	50.0%	X	0.0%	X	0.0%	X	0.0%	X
Two or More	60.0%	X	72.7%	11	40.0%	X	66.7%	12
Unknown or Decline	100.0%	X	100.0%	X	0.0%	X	100.0%	X
White	81.3%	16	76.9%	13	72.2%	18	70.6%	17
<i>Gender</i>								
M	65.9%	82	73.3%	90	67.6%	102	67.0%	91
F	74.1%	193	64.7%	187	73.4%	207	74.1%	185
X	0.0%	X	0.0%	X	0.0%	X	0.0%	X
<i>Age Groups</i>								
19 or less	77.1%	35	76.6%	47	78.0%	50	69.7%	33
20 to 24	67.9%	131	68.3%	126	68.5%	130	73.4%	128
25 to 49	74.8%	103	62.1%	103	72.8%	125	70.3%	111
Over 49	66.7%	X	100.0%	X	50.0%	X	75.0%	X
X: Counts are suppressed for groups with less than 10 students.								
Shaded regions indicate groups achieving at a rate less than 80% of the reference group, respectively. Reference groups are White, male, and 20 to 24 years old.								

d) Retention rates

The retention rates from fall 2013 to spring 2017 are shown in the table below. There was a slight decrease of less than three percent from 2015 to 2016. Overall, however, there was an increase in the retention rate from 2013 to 2016 of 16 %. Chemistry courses are very demanding and one of the reasons for the decrease in retention rates might be that many of the students work and do not have much time to dedicate to their studies. Many students also do not have adequate study skills and do not perform well in science course, forcing them to drop the course.

Table 8. Retention Rates

Year	Total Grades	Retention Rate
FA 2013	245	73.1%
2014	549	81.6%
2015	558	82.3%
2016	620	85.0%
SP 2017	276	84.1%

The instructors provide resources to struggling students but many do not have the time to study, attend office hours, or put into practice the advised study skills. One method of improving the retention rate might be to increase the tutoring resources and pursue online tutoring to assist specifically those working students who cannot attend campus for tutoring services or the instructor's office hours.

e) A comparison of success and retention rates in face-to-face classes with distance education classes

The department currently does not offer online or hybrid chemistry courses. Discussion is ongoing among faculty members.

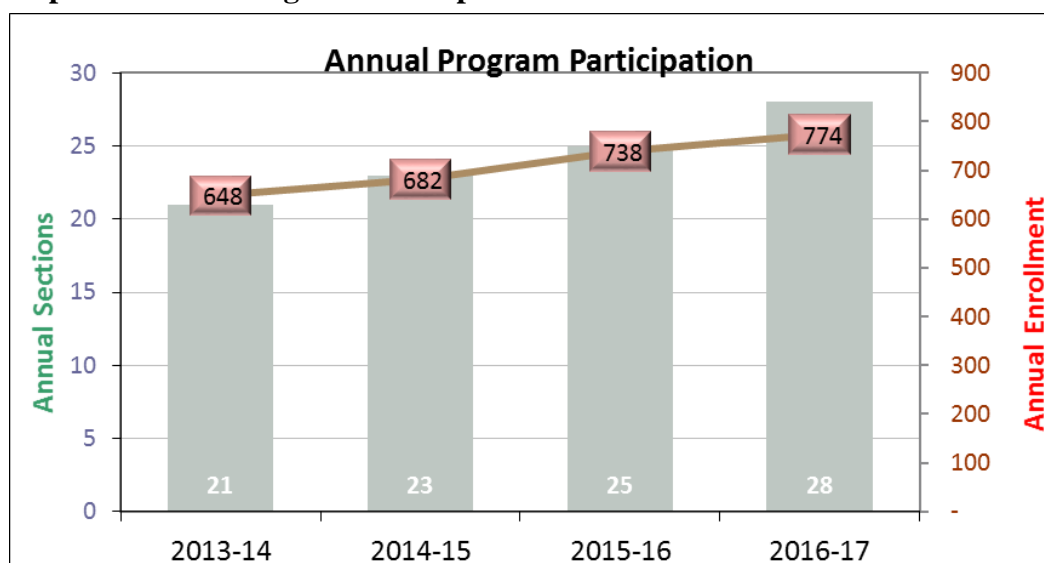
f) Enrollment statistics with section and seat counts and fill rates

The annual enrollment and annual section numbers are summarized on Table 9 and graph 1 below. The annual enrollment has increased from 2013-14 to 2016-17 by about 19 percent. The average annual enrollment was 711 within these four-year span. The number of sections offered has also increased from 21 sections to 28 sections in these four years.

Table 9. Annual Enrollment

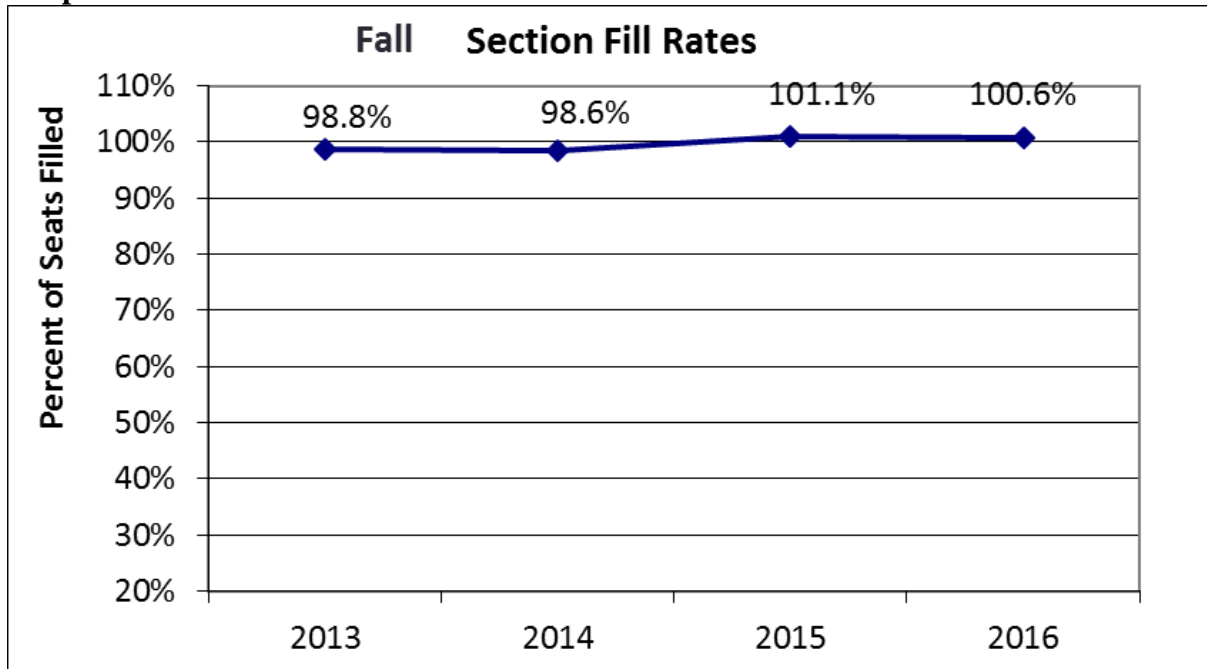
	2013-14	2014-15	2015-16	2016-17	4 Yr Average
Annual Enrollment	648	682	738	774	711

Graph 1. Annual Program Participation and Annual Sections

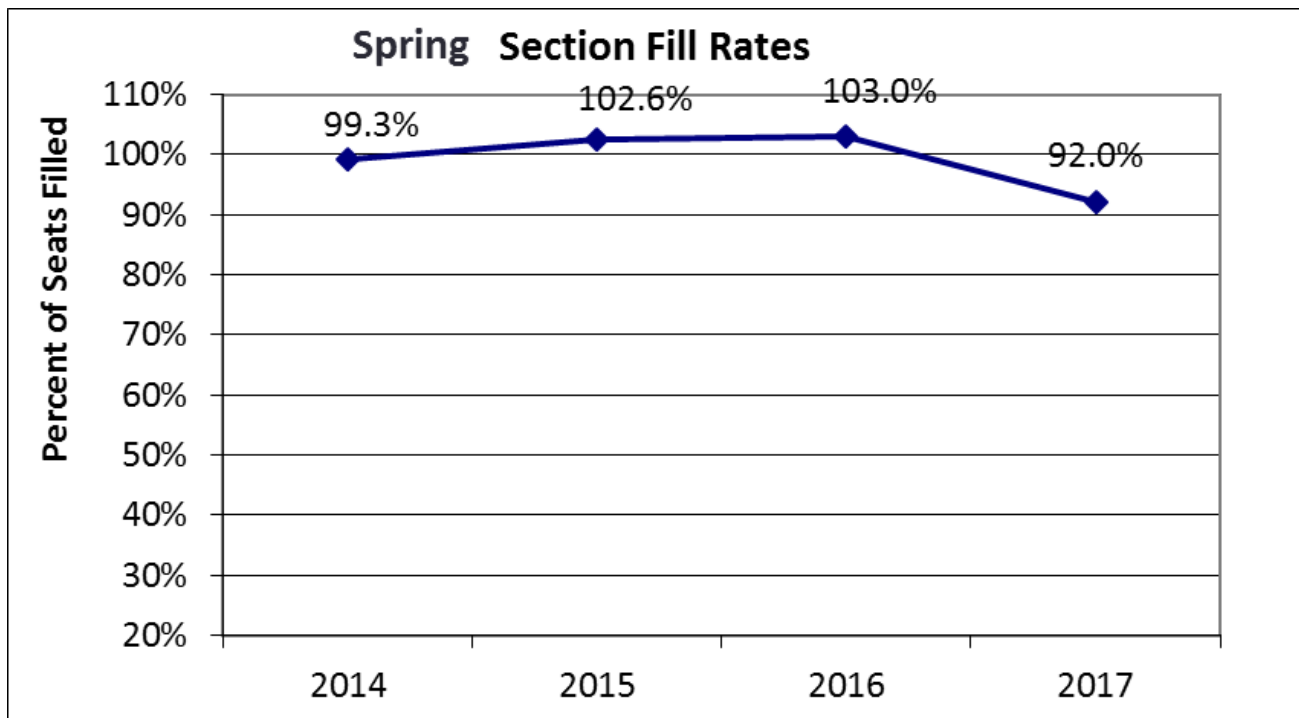


There is still a high demand for chemistry courses. This high demand is demonstrated by the fill rate of over 100 % for the last three years (see graphs 2 and 3 below). There was only a slight decrease in the 2017 spring semester. Chemistry 1A and 1B tend to be two courses that constantly become over filled. When Chemistry 1B was first offered during the 2018 spring semester (data not shown), it filled within the first weeks and it had a long waitlist. The courses that are in extreme high demand are Chemistry 1A and Chemistry 1B.

Graph 2. Fall Section Fill Rates



Graph 3. Spring Section Fill Rates



g) Scheduling of courses (day vs. night, days offered, and sequence)

Most of the sections offered in the Chemistry Department are Monday through Thursday during the day, with two sections of both Chemistry 4 and Chemistry 20 offered at night. Almost 60% of our students in the Chemistry Department enroll during the day, for both spring and fall terms; this is congruent with the times commonly attended by most of the student body at Compton College. The percent of enrolled students during the night versus day are shown on the tables below. Our scheduling is meeting the demand and availability of our student body.

Table 10. Enrollment by Time of Day

Fall Term	2013	2014	2015	2016
Day	60.4%	63.9%	65.5%	59.6%
Night	39.6%	36.1%	34.5%	40.4%
Weekend/Unknown	0.0%	0.0%	0.0%	0.0%

Table 11. Enrollment by Time of Day

Spring Term	2014	2015	2016	2017
Day	64.7%	66.4%	59.2%	58.3%
Night	35.3%	33.6%	40.8%	41.7%
Weekend/Unknown	0.0%	0.0%	0.0%	0.0%

h) List related recommendations.

1. Increase the number of sections offering SI.
2. Use the online tutoring services in Canvas or develop one for our Program.
3. Allow faculty to hold on-line office hours and have it count as fulfillment of their contract hours.

3. Curriculum

There has been a high demand for STEM Chemistry courses. To meet this demand, the department added Chemistry 1B to the curriculum. We began offering Chemistry 1B for the summer semesters only, but we are offering one section of 1B this spring 2018 semester. This course is one of the sections that filled within weeks after registration opened last semester. We have also added another day section of Chemistry 1A and a night section of Chemistry 4.

The enrollment for Chemistry 21A was high in both fall semesters that it was offered. The enrollment for Chemistry 21B, however, was very low. The number of students enrolled in Chemistry 21B for the spring 2013 and spring 2014 semesters was 13 and 9, respectively. Due to this low demand for Chemistry 21B, the Chemistry 21 series is no longer offered. It should be noted that Chemistry 21B usually has low enrollment. At El Camino College, about four sections of Chemistry 21A feed into one section of Chemistry 21B. It appears that many of the students, who successfully passed Chemistry 21A, take the course to fulfill the pre-requisite for Microbiology. The decision to not offer Chemistry 21A and 21B was also to make room to offer Chemistry 1A and Chemistry 1B.

The Chemistry department does not offer any distance education courses. It would be beneficial to pursue the possibility of a hybrid course. There are some colleges who have successfully offered Chemistry 4 and 20 online. By offering a hybrid course, where the lecture is online and the laboratory and discussion hour is in-person, the department would be able to increase the number of courses and sections offered and better engage and service our students.

In previous years, the strongest demand in the department was courses for those students pursuing careers in health science and related fields; that is Chem 20 and Chem 21 A/B. But now the demand is moving more towards the STEM majors, making Chemistry 4, 1A and 1B a priority for the department. To this end, beginning in the spring 2014 semester, the department began expanding the course offering for science and engineering majors by adding more sections of Chemistry 4. Currently, we offer three sections of Chemistry 4, one in the morning and two in the evening. Furthermore, in 2014-2015 one section of Chemistry 1A was added. Now, we are offering two day sections of Chemistry 1A. Chemistry 1B is offered in the summer session and one section was added this spring 2018 semester.

The Chemistry Department continues to review and revise the curriculum to make the necessary changes to improve student success and keep current with the technological and curriculum changes. Table 12 below summarizes the Course Review Timeline for the current courses offered.

Table 12. Course Review Timeline

Course Number	Course Title	Course Review Date	Transferability
Chem 20	Fundamentals of Chemistry	2020-2021	Yes
Chem 4	Beginning Chemistry	2018-2019	Yes
Chem 1A	General Chemistry I	2020-2021	Yes
Chem 1B	General Chemistry II	2021-2022	Yes

The department currently does not offer degrees or certificates. It does offer courses which are required for a Chemistry A.S. and A.S.T. degrees, Chemistry 1A and 1B. The mission and goal of the department is to prepare students to possess the knowledge and skills to pursue further education and careers in the chemical, physical, and health sciences. The expansion of the offered courses is the first step in fulfilling this mission.

Recommendations.

1. Offer hybrid courses for Chemistry 20 and then Chemistry 4 to provide an alternative learning route that serves working students. The courses would be taught with the lecture online, a discussion and laboratory sections on-campus.
2. Increase the budget to buy and maintain the equipment needed to expand and offer more general chemistry courses.
3. Increase the sections offered. This may be done by scheduling the lecture in a room other than MS 228 or MS 231 and use MS 228 and MS 231 primarily as a laboratory room.
4. Increase the courses offered for science and engineering majors; that is Organic Chemistry.

4. Assessment and Student and Program Learning Outcomes (SLOs & PLOs)

The Chemistry Program has three Student Learning Outcomes (SLOs) and Program Level Outcomes (PLOs) for every chemistry course, which are aligned with the Institutional Learning Outcomes (ILOs) as shown in the tables found in Appendix A.

All of the Chemistry courses have been assessed for all three SLOs and for PLOs #1 and #3. SLO #1 was assessed in fall 2016 for Chemistry 4, 20 and 1A. SLO #2 was assessed and reported on fall 2015 for Chemistry 4, 20 and 1A. SLO #3 was assessed in fall 2014 for Chemistry 20 and 1A and will be reported in this spring 2018 for Chemistry 4. The equation writing PLO was reported in fall 2016 and PLO #3 was assessed on the fall 2014 semester. The department has continued to keep up-to-date with the changes and timelines set by the SLO and PLO committee.

In fall 2016 all of the Chemistry 20 sections, Chemistry 4 and Chemistry 1A were assessed for the equation writing SLO (SLO #1). At the time of the assessment, less than the set standard of 75% passed this assessment. An average of 60% of students taking Chem 20 and Chem 4 were able to complete the SLO assessment successfully. This is typical of the success levels at CC for non-STEM majors. The successful completion percentage of 81, however, was obtained for Chem 1A. Considering that the majority of Chem 1A students have taken Chem 4 before as a prerequisite, most students have had more practice and better understanding on equation writing than students in the other two courses. The faculty, however, were concerned because the results were below the 75 % standard and have expressed a commitment to work on revisiting the material and creating more integrated approaches to learning course content. Some changes include having more in-class activities/worksheets addressing this objective. The faculty also agreed to offer the SLO assessment closer to the presentation of the material in the lecture sequence and to more frequently re-address the concept, as this is fundamental to the course.

SLO #2, structural representation of compounds, was assessed in the fall 2015 semester for all three courses (Chem 4, 20 and 1A). Chem 20 and 4 courses met the standard for this SLO. An average of 77% of the students were able to draw a correct Lewis Structure and determine the shape of the molecule. In chemistry 1A, 90% of the students correctly were able to draw the Lewis Structure. This high percentage suggests that the faculty is applying the most efficient practices to teach this topic. This could also suggest that Chemistry 1A students have had more practice drawing these presentations. In Chemistry 1A, students are were also asked to draw the structure in 3D and correctly predict the molecular shape. Only 68% were able to correctly draw the 3D structure and 63% were able to correctly determine the molecular shape. Faculty has agreed to create better practice worksheets so students can complete in class, introduce more analogies when discussing these topics in class and have students create molecular models.

In the fall 2014 semester, SLO #3 was assessed for all three courses. Ninety-seven percent of the students enrolled in these courses correctly wore goggles by week 7 of the semester. We believe that this overwhelmingly high percentage might be in part because the program has adapted a new safety protocol where the faculty thoroughly cover laboratory safety on the first week of class. Additionally, each student is required to pass a safety quiz with a score of 80% or higher in order to perform any laboratory experiments that semester. Some faculty have also adapted a point-based system, in which points are deducted for not wearing goggles. Similar results were obtained for

PLO #3. By week seven only 10 of the 161 students were reminded to wear goggles; that is a 94% passing rate. This SLO was recently assessed for Chemistry 4. Out of 45 students only seven of the 48 students were reminded to correctly wear goggles on week 3. By week 9, only 3 of the 40 were reminded; this is a 75% average. This lower passing percentage might be because the full-time faculty needs to work with the adjuncts to ensure that they are introducing the safety protocol to students and we might also need to adapt a point-based system for the entire program to encourage students to follow safety rules. Some faculty have also made contact with one adjunct faculty in the video department on developing a safety video. This can help illustrate safety in different styles and it can also provide a good opportunity for inter departmental collaboration.

Overall, some of the faculty has expressed interest in incorporating more integrated classroom activities. We want the proficiency standard to be 80% or higher. It would be ideal to assess the SLOs once a year to track the progress and make any curriculum changes accordingly to improve students' learning.

Recommendations.

1. Create a series of videos which reviews the important concepts in each class.
2. Allocate more class time to thoroughly cover these topics
3. Have more in-class worksheets and activities for students to review and learn these objectives
4. Assess progress once a year and make necessary changes to improve student learning.

5. Analysis of Student Feedback

The Student Feedback Survey asks students to rate the program according to the following categories: Student Support, Curriculum, Facilities & Equipment, and Program Objectives. The rating scale ranges from 1 (Strongly Disagree) to 5 (Strongly Agree). An average score of 5.00/5.00 would mean every student indicated “Strongly Agree” for that question, while a score of 4.00/5.00 would mean students were selecting the “Agree” response on average. The results are found in Appendix A.

There were 134 students that were surveyed. Related to Student Support, the average scores were between 3.99 and 4.30, meaning most students were indicating at least “Agree” that the student were happy with the student support offered by the Chemistry Program. The highest-rated Student Support aspect was instructors’ providing opportunities for active participation (4.30), while the lowest-rated aspect was feeling a sense of community within the program (3.99). The faculty needs to do a better job at creating and fostering a sense of community so the students feel welcome. While feeling a sense of community was the lowest-rated question, it was largely due to a relatively high number of students providing a neutral response. The aspects with the most disagreement from students were related to instructors helping students achieve academic goals (13% disagreement) and instructors helping students stay on track (11% disagreement). The faculty needs to incorporate strategies to maintain students on track so they may achieve their academic goals. To this end, some faculty plan on holding more grade review sessions throughout the semester and also address any students who are not performing well and need more assistance.

The students’ responses were between 3.54 and 4.24 for the questions on Curriculum. This means that the average student is between agreement and the neutral response when it comes to the curriculum offered by the Chemistry Department. The highest-rated Curriculum aspect was being able to register for necessary classes (4.24), while the lowest rated aspect was the availability of extracurricular activities related to the program (3.54). The availability of extracurricular activities also had the most disagreement among student responses (16%), while the ability to register for necessary classes had the least (3%). The Chemistry Department does not have any extracurricular activities and it is something the faculty need to address. For example, we organize a “magic show” for open house or planning field trips. There were a number of students who disagreed about an appropriate range of course offerings (13%). This may be because we are just expanding our STEM course offerings and need to offer the Organic Chemistry course series. We plan to offer Organic Chemistry within two years. Eleven percent of the students disagreed with the convenience of course scheduling. This is something we need to plan and work on rearranging the schedule.

The Chemistry Department needs to improve classrooms cleanliness, and overall overhaul its facilities. About 20% were unsatisfied with the quality of buildings and classrooms. This is understandable and not at all surprising. The classrooms do not get swept and/or mopped regularly. There is usually always trash on the floors. There are not enough trashcans; not enough paper towels. The faculty constantly has to get paper towels from the faculty restrooms. We need to work with facilities to improve on the cleanliness and facilities to retain and attract more students. We also need to work with the laboratory technician to set up a schedule to clean and dust the classroom in a regular basis. Moreover, the classrooms and buildings were rated the lowest (3.54). The second

lowest scored question was class equipment (3.65). A number of students disagreed about the satisfactory quality of class equipment (19%).

Most students (88%) agreed they were aware of the course outcomes for courses in the Chemistry program (average score 4.36). There was very little disagreement for this question (3%). It seems, then, that most faculty are conveying and covering the course outcomes to the students.

Recommendations.

1. Develop organic chemistry curriculum
2. Work with facilities to have the rooms swept and mop more regularly
3. Set up a schedule for the laboratory technician to clean and organize the chemistry rooms
4. Plan and organize a magic show for the Open House or similar event
5. Plan and organize extracurricular activities

6. Facilities and Equipment

Most of all of the Chemistry lectures and all laboratories are taught in two classrooms. The department also has two rooms that serve as stockrooms; however, one of these rooms is shared and has the photocopier machine. Our room space is limited and will impede the growth of the department.

Our department has a number of immediate facilities and equipment needs that are described below.

1. The faucets in MS 228 and MS 231 need to be fixed. There are some faucets that continuously leak and others that are missing. Normally, we like to pair students for the labs requiring the use of faucets and aspirators. This is not possible due to the limited number of working faucets that we have. These labs force us to group the students into groups of four or more. Having large groups impedes the students' hands-on experiences. We have submitted several work orders for over a year but nothing has been done about it.
2. Maintain and repair existing laboratory equipment and glassware as needed due to continued use.
3. Install lighting under the cabinets by the back of the rooms in MS 228 and MS 231. These areas become extremely dark when part of the lights are turned off and it becomes difficult for the students to see their work.

The Chemistry Program has the following long-range needs:

1. Install overhead exhaust stations in both chemistry laboratories.
2. The department needs the following equipment to prepare to offer Chemistry 7A/B.
 - A. Purchase two Gas Chromatography Mass Spectrometers (GC-MS) to use in the instruction of Chemistry 7A/B.
 - B. Purchase two FT-IR spectrometers
 - C. Purchase at least 15 portable Nuclear Magnetic Resonance (NMR) spectrometers.
 - D. Purchase 20 heating/stir plates
 - E. Purchase 35 Organic Chemistry glassware kits

Recommendations (*the prices included below are an approximation*)

1. Repair and replace the non-functional and/or missing faucets in MS 228 and 231.
2. Install lighting under the cabinets.
3. Install overhead exhaust stations in MS 228 and 231.
4. Purchase two GC-MS; \$6,000
5. Purchase 5 Vernier Mini GC Plus Gas Chromatograph, \$1,999 each
6. Purchase two Thermo Scientific iS FT-IR spectrometer; \$3,700 each
7. Purchase 15 portable, bench top NMR spectrometers; \$10,000
8. Purchase heating/stir plates; \$1,500
9. Purchase 35 Organic Chemistry glassware kits; \$13,650

7. Technology and Software

Typically the Chemistry faculty use a laptop (or desktop), a document camera, and projectors. Some of the instructors incorporate Canvas or websites for the students to access the class material. The only program that the department uses right now is Chem Draw. We need to buy a license so each faculty member has access to this program. Once we begin offering Chemistry 7A/B we will need to purchase a license to install Chem Draw to the computers in the computer lab for the students to use.

Recommendations:

- Purchase license for Chem Draw for the faculty.
- Purchase a site license to install in the computer lab

8. Staffing

In the spring of 2018, the Chemistry department added a tenure-track faculty member bringing the number of total full-time tenure-track faculty to three. There are a total of seven adjunct faculty. The department offers four courses with 12 sections of which 42 % are taught by full-time faculty.

There is one physical science technician responsible for assisting all physical science faculty, including the Chemistry, Physics, Astronomy, and Earth Science departments. With the increase in the courses being offered and the demand for the preparation of the materials and demonstrations, the workload of the lab technician has increased. Additionally, the department wants and plans to offer Chemistry 7A/B. In anticipation and preparation for this goal, another full-time lab technician that specializes in Organic Chemistry will be needed, or at least a part-time lab technician. Alternatively, and prior to offering Organic Chemistry, we can hire a student worker.

Recommendation:

- A full-time or part-time lab technician specializing in Organic Chemistry will be needed to plan to offer Chemistry 7A/B.

9. Future Direction and Vision

The direction and vision of the Chemistry Department at Compton College is to provide students with a chemistry foundation that they need for their program of study and provide them with the best education possible. To achieve these goals, our department will continue to improve the current teaching methodologies, develop innovative methods to better equip our students with the knowledge and technology they may need to succeed, improve/modify the curriculum, and strive to offer more STEM major courses. We would like the entire Chemistry faculty to incorporate more cooperative learning methods and innovative technology to teach our students not only the knowledge of chemistry but skills which will help them become better students and citizens.

There is a high demand for chemistry, not only on our campus, but nationwide. We would like to expand our program and offer more STEM courses at CC. Unfortunately, the lack of classroom and lab space hinders our growth. One possibility to overcome this difficulty is to develop hybrid courses, in which the lecture is taught online and the lab and a discussion hour would be performed on campus. There are some colleges, such as Los Angeles Valley College, that offer hybrid courses (Chem 4 and Chem 1A) and have been successful for several years.

Recommendations

1. Develop Organic Chemistry curriculum
2. Develop a hybrid Chem 20 course

10. Prioritized Recommendations

Our priority in the Chemistry Program is to improve the retention and success rates of our students. We believe we begin to accomplish these objectives by first ensuring that the faculty have the required and necessary resources to provide quality instructions. First and for most, the faculty and staff need to be able to create the required materials to provide to our students by having the required software. Then, the facilities need to be adequate to foster a welcoming educational environment by performing all facility repairs. This include working with facilities and maintenance to sweep and mop the classrooms more frequently, restocking the paper towels, adding more trashcans. The laboratory technician also needs to dust and clean the classrooms, tables, and cabinets once a week. We believe that by offering SI in most, if not all, courses and sections the retention and equity gap can be addressed. The faculty has also observed and received feedback from students that having on-line resources would help them succeed in their academic goals; as many do not have the time to come to campus and take advantage of the tutoring services. Lastly, we plan to expand our program to meet the demand of more STEM majors and offer a degree in Physical Science or Chemistry by offering Organic Chemistry.

Recommendations	Cost Estimate	Strategic Initiatives
1. Purchase license for Chem Draw Software for all faculty	2,000	1, 2 & 3
2. Repair the faulty faucets in MS 228 and 231	2,000	1
3. Work with facilities to have rooms clean more regularly		1 & 2
4. Have laboratory technician clean classrooms		1 & 2
5. Install lighting under cabinets	3000	1
6. Increase the number of sections with SI coaches	3,000	1, 2, 3, & 4
7. Offer a hybrid course for Chemistry 20		1, 2, 3, & 4
8. Develop an on-line tutoring system		1, 2, 3, & 4
9. Increase budget to purchase and maintain necessary equipment for the added courses	5000	1, 2, 3, & 4
10. Create educational videos	1000	1, 2, 3, & 4
11. Create videos for laboratory techniques	1000	1, 2, 3, & 4
12. Hire a student worker for stockroom	10,000	1, 2 & 3
13. Purchase two GC-MS spectrometers	6,000	1, 2, & 3
14. Purchase two FT-IR spectrometers	7,500	1, 2, & 3
15. Purchase 15 portable NMR spectrometers	15,000	1, 2, & 3
16. Purchase 20 heating/stir plates	5000	1, 2, & 3
17. Purchase 35 Organic Chemistry Glassware kits	14,000	1, 2, & 3
18. Install overhead exhaust stations	30,000	1, 2, & 3
19. Offer Chemistry 7A/B	20,000	1, 2, & 3
20. Purchase chemical balances	20,000	1, 2, & 3

Appendix A

I. SLO and PLO Alignments with ILO

NATURAL SCIENCES Institutional (ILO), Program (PLO), and Course (SLO) Alignment							
Program: Chemistry		Number of Courses: 8	Date Updated: 10.02.2014	Submitted by: T. Jim Noyes, ext. 3356			
ILOs	1. Critical Thinking <i>Students apply critical, creative and analytical skills to identify and solve problems, analyze information, synthesize and evaluate ideas, and transform existing ideas into new forms.</i>	2. Communication <i>Students effectively communicate with and respond to varied audiences in written, spoken or signed, and artistic forms.</i>	3. Community and Personal Development <i>Students are productive and engaged members of society, demonstrating personal responsibility, and community and social awareness through their engagement in campus programs and services.</i>	4. Information Literacy <i>Students determine an information need and use various media and formats to develop a research strategy and locate, evaluate, document, and use information to accomplish a specific purpose. Students demonstrate an understanding of the legal, social, and ethical aspects related to information use.</i>			
<p>SLO-PLO-ILO ALIGNMENT NOTES:</p> <p><i>Mark boxes with an 'X' if: SLO/PLO is a major focus or an important part of the course/program; direct instruction or some direct instruction is provided; students are evaluated multiple times (and possibly in various ways) throughout the course or are evaluated on the concepts once or twice within the course.</i></p> <p><i>DO NOT mark with an 'X' if: SLO/PLO is a minor focus of the course/program and some instruction is given in the area but students are not formally evaluated on the concepts; or if the SLO/PLO is minimally or not at all part of the course/program.</i></p>							
PLOs				PLO to ILO Alignment <i>(Mark with an X)</i>			
				1	2	3	4
PLO #1 Equation Writing Students will be able to express chemical reaction word problems in the correct format.				X	X		
PLO #2 Structural Representations of Compounds Students will be able to represent the structures of compounds based on chemical bonding theory.				X	X		
PLO #3 Lab Safety Students will take the necessary precautions to ensure proper laboratory safety.					X	X	

SLOs	SLO to PLO Alignment <i>(Mark with an X)</i>			COURSE to ILO Alignment <i>(Mark with an X)</i>			
	P1	P2	P3	1	2	3	4
	CHEM 1A General Chemistry I: SLO #1 Equation Writing On a written exercise, given the names of chemical compounds, students will be able to write the correct reactant formulas, states of matter (when required), identify reaction type, predict the product formulas and balance the chemical equation.	X					
CHEM 1A General Chemistry I: SLO #2 Structural Representations of Compounds Students will be able to create (via molecular models or drawings) accurate representations of compounds. The representations will contain appropriate bonds, lone pairs, and geometry.		X		X	X	X	
CHEM 1A General Chemistry I: SLO #3 Content Knowledge (Mitosis) Students will adhere to safety protocol in the laboratory regarding eye protection. Students will follow the proper procedure regarding wearing goggles in the laboratory, and keeping them on to protect their eyes.			X				
CHEM 2A General Chemistry II: SLO #1 Equation Writing On a written exercise, given the names of chemical compounds, students will be able to write the correct reactant formulas, states of matter (when required), identify reaction type, predict the product formulas and balance the chemical equation.	X						
CHEM 2A General Chemistry II: SLO #2 Structural Representations of Compounds Students will be able to create (via molecular models or drawings) accurate representations of compounds. The representations will contain appropriate bonds, lone pairs, and geometry.		X		X	X	X	
CHEM 2A General Chemistry II: SLO #3 Content Knowledge (Mitosis) Students will adhere to safety protocol in the laboratory regarding eye protection. Students will follow the proper procedure regarding wearing goggles in the laboratory, and keeping them on to protect their eyes.			X				
CHEM 20 Fundamentals of Chemistry: SLO #1 Chemical Formulas of Reactants On a written exercise, given the chemical formulas of reactants, students will be able to write the correct formulas of products, identify the reaction type and balance the equation.	X						
CHEM 20 Fundamentals of Chemistry: SLO #2 Molecular Models and Drawings Students will be able to create (via molecular models or drawings) accurate representations of compounds. The representations will contain appropriate bonds, lone pairs, and geometry.		X		X	X	X	
CHEM 20 Fundamentals of Chemistry: SLO #3 Safety Protocol Students will adhere to safety protocol in the laboratory regarding eye protection. Students will follow the proper procedure regarding wearing goggles in the laboratory, and keeping them on to protect their eyes.			X				

SLOs	SLO to PLO Alignment <i>(Mark with an X)</i>			COURSE to ILO Alignment <i>(Mark with an X)</i>			
	P1	P2	P3	1	2	3	4
	CHEM 21A Survey of General and Organic Chemistry: SLO #1 Names of Chemical Compounds On a written exercise, given the names of chemical compounds, students will be able to write the correct reactant formulas, states of matter (when required), identify reaction type, predict the product formulas and balance the chemical equation.	X			X	X	X
CHEM 21A Survey of General and Organic Chemistry: SLO #2 Molecular Models and Drawings Students will be able to create (via molecular models or drawings) accurate representations of compounds. The representations will contain appropriate bonds, lone pairs, and geometry.		X					
CHEM 21A Survey of General and Organic Chemistry: SLO #3 Safety Protocol Students will adhere to safety protocol in the laboratory regarding eye protection. Students will follow the proper procedure regarding wearing goggles in the laboratory, and keeping them on to protect their eyes.			X				
CHEM 21B Survey of Organic and Biochemistry: SLO #1 Structures of Reactants for a Reaction On a written exercise, given the structures of reactants for a reaction, students will be able to write the correct structures of products and identify the reaction type.	X			X	X	X	
CHEM 21B Survey of Organic and Biochemistry: SLO #2 Molecular Models and Drawings Students will be able to create (via molecular models or drawings) accurate representations of compounds. The representations will contain appropriate bonds, lone pairs, and geometry.		X					
CHEM 21B Survey of Organic and Biochemistry: SLO #3 Safety Protocol Students will adhere to safety protocol in the laboratory regarding eye protection. Students will follow the proper procedure regarding wearing goggles in the laboratory, and keeping them on to protect their eyes.			X				
CHEM 4 Beginning Chemistry: SLO #1 Equation Writing On a written exercise, given the names of chemical compounds, students will be able to write the correct reactant formulas, states of matter (when required), identify reaction type, predict the product formulas and balance the chemical equation.	X			X	X	X	
CHEM 4 Beginning Chemistry: SLO #2 Structural Representations of Compounds Students will be able to create (via molecular models or drawings) accurate representations of compounds. The representations will contain appropriate bonds, lone pairs, and geometry.		X					
CHEM 4 Beginning Chemistry: SLO #3 Lab Safety Students will adhere to safety protocol in the laboratory regarding eye protection. Students will follow the proper procedure regarding wearing goggles in the laboratory, and keeping them on to protect their eyes.			X				

II. SLO Timeline (2017 - 2020)

Division: Division 1

Program: Chemistry

Program Review Year: _____

Directions: Use this worksheet to enter the existing assessment timelines for 2016 and distribute assessments for each SLO/PLO statement over the next four-year timeline (2017-2020). Type an **X** in the cells below to indicate the semester in which the SLOs/PLOs are being assessed. This worksheet should be emailed to the division facilitator by _____ . Facilitators are responsible for making sure the information is complete and e-mailing an electronic copy of this Timeline Worksheet document (in Word or PDF format) to ipena@elcamino.edu by _____. Once received by the SLO Administrative Assistant, this information will be input into TracDat.

Course and SLO #	Note if offered only in FA/SU/SP	SP 2016	SU 2016	FA 2016	SP 2017	SU 2017	FA 2017	SP 2018	SU 2018	FA 2018	SP 2019	SU 2019	FA 2019	SP 2020	SU 2020	FA 2020
PLO #1																X
PLO #2													X			
PLO #3										X						
CHEM 1A - SLO #1																X
CHEM 1A - SLO #2													X			
CHEM 1A - SLO #3										X						
CHEM 20 - SLO #1																X
CHEM 20 - SLO #2													X			
CHEM 20 - SLO #3										X						
CHEM 21A - SLO #1																
CHEM 21A - SLO #2																
CHEM 21A - SLO #3																
CHEM 21B - SLO #1																
CHEM 21B - SLO #2																
CHEM 21B - SLO #3																
CHEM 4 - SLO #1														X		
CHEM 4 - SLO #2											X					
CHEM 4 - SLO #3								X								

III. Program Review Student Feedback Survey

Program Review Student Feedback Survey							
N = 134		Chemistry		Spring 2018			
Instructors in this program have helped me achieve my academic goals.			Instructors in this program have helped me stay on track.				
Response	Frequency	Percent	Mean: 4.10	Response	Frequency	Percent	Mean: 4.12
Strongly Agree	61	45.52		Strongly Agree	63	47.01	
Agree	47	35.07		Agree	45	33.58	
Neither Agree nor Disagree	9	6.72		Neither Agree nor Disagree	11	8.21	
Disagree	13	9.70		Disagree	9	6.72	
Strongly Disagree	4	2.99		Strongly Disagree	6	4.48	
Missing	0	0.00		Missing	0	0.00	
Instructors in this program provide opportunities to actively participate in my classes.			I have felt a sense of community within this program.				
Response	Frequency	Percent	Mean: 4.30	Response	Frequency	Percent	Mean: 3.99
Strongly Agree	70	52.24		Strongly Agree	55	41.04	
Agree	45	33.58		Agree	40	29.85	
Neither Agree nor Disagree	12	8.96		Neither Agree nor Disagree	25	18.66	
Disagree	3	2.24		Disagree	8	5.97	
Strongly Disagree	4	2.99		Strongly Disagree	5	3.73	
Missing	0	0.00		Missing	1	0.75	
Student contributions have been valued by instructors in this program.			There is an appropriate range of courses offered in this program.				
Response	Frequency	Percent	Mean: 4.20	Response	Frequency	Percent	Mean: 3.83
Strongly Agree	67	50.00		Strongly Agree	40	29.85	
Agree	36	26.87		Agree	55	41.04	
Neither Agree nor Disagree	21	15.67		Neither Agree nor Disagree	22	16.42	
Disagree	7	5.22		Disagree	10	7.46	
Strongly Disagree	2	1.49		Strongly Disagree	7	5.22	
Missing	1	0.75		Missing	0	0.00	
Courses were scheduled on days and times that were convenient to me.			I've been able to register for the classes I need within this program.				
Response	Frequency	Percent	Mean: 3.99	Response	Frequency	Percent	Mean: 4.24
Strongly Agree	53	39.55		Strongly Agree	61	45.52	
Agree	50	37.31		Agree	49	36.57	
Neither Agree nor Disagree	16	11.94		Neither Agree nor Disagree	19	14.18	
Disagree	7	5.22		Disagree	2	1.49	
Strongly Disagree	8	5.97		Strongly Disagree	2	1.49	
Missing	0	0.00		Missing	1	0.75	

The courses in this program have helped me meet my academic goals.

Response	Frequency	Percent	Mean: 4.20
Strongly Agree	61	45.52	
Agree	47	35.07	
Neither Agree nor Disagree	16	11.94	
Disagree	5	3.73	
Strongly Disagree	3	2.24	
Missing	2	1.49	

There is a variety of extracurricular activities related to this program on campus.

Response	Frequency	Percent	Mean: 3.54
Strongly Agree	36	26.87	
Agree	33	24.63	
Neither Agree nor Disagree	42	31.34	
Disagree	11	8.21	
Strongly Disagree	11	8.21	
Missing	1	0.75	

The library has the resources to help me succeed in this program.

Response	Frequency	Percent	Mean: 3.93
Strongly Agree	44	32.84	
Agree	50	37.31	
Neither Agree nor Disagree	30	22.39	
Disagree	7	5.22	
Strongly Disagree	3	2.24	
Missing	0	0.00	

The buildings and classrooms used by this program are satisfactory.

Response	Frequency	Percent	Mean: 3.54
Strongly Agree	27	20.15	
Agree	56	41.79	
Neither Agree nor Disagree	24	17.91	
Disagree	17	12.69	
Strongly Disagree	10	7.46	
Missing	0	0.00	

I am satisfied with the equipment [projectors- machinery- models- etc.] used in this program.

Response	Frequency	Percent	Mean: 3.65
Strongly Agree	35	26.12	
Agree	50	37.31	
Neither Agree nor Disagree	24	17.91	
Disagree	17	12.69	
Strongly Disagree	8	5.97	
Missing	0	0.00	

I am satisfied with the computers and software used in this program.

Response	Frequency	Percent	Mean: 3.73
Strongly Agree	33	24.63	
Agree	51	38.06	
Neither Agree nor Disagree	37	27.61	
Disagree	7	5.22	
Strongly Disagree	6	4.48	
Missing	0	0.00	

I am aware of the course outcomes - what I should be able to learn and what skills I should possess after completing courses in the program.

Response	Frequency	Percent	Mean: 4.36
Strongly Agree	69	51.49	
Agree	49	36.57	
Neither Agree nor Disagree	12	8.96	
Disagree	3	2.24	
Strongly Disagree	1	0.75	
Missing	0	0.00	