Instructional Programs

2017-2018 Self-Study

Three-Year Program Review

Chemistry

Natural Sciences Division

Statement of Collaboration

The program faculty listed below collaborated in an open and forthright dialogue to prepare this Self Study. Statements included herein accurately reflect the conclusions and opinions by consensus of the program faculty involved in the self-study.

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Authorization

After the document is complete, it must be signed by the Principal Author, the Department Coordinator, and the Dean prior to submission to the Program Review Committee.

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1.0 Mission and Goals

Mission

The Chemistry Department in the Division of Natural Sciences is an integral part of Fullerton College and shares in the College's mission to advance student learning and achievement, and is dedicated towards promoting excellence in learning. The Chemistry Department embodies the universal aspect of the College's mission by offering courses needed to meet general education requirements and to transfer to a four-year institution or professional school as chemistry or science, technology, engineering, and math (STEM) majors. The program excels in balancing academic tradition with innovation as described in the core values of the institution by using a variety of methodologies in the classroom and laboratory environment. The course retention and success are both impacted and improved by the use of class response systems ("clickers") and presentation tools (Doceri software and iPads) in the classroom, computer studios and Vernier probes and software within the laboratory environment, and online homework for out-of-class instruction and assessment.[1]

Vision

The academic mission of the Chemistry Department is characterized by the pursuit of academic rigor and integrity, excellence in instruction, intellectual accomplishment, and community service. The program is aligned with the vision statement of the College. The Department has created a community that promotes inquiry and intellectual curiosity, personal growth and a life-long appreciation for the power of learning that can transform lives and inspire a positive change in the world.

Chemistry is an experiment-based discipline that promotes inquiry and intellectual curiosity. Students in the program regularly make discoveries within the laboratory environment that mirror the concepts and ideas being discussed within the classroom. The very nature of chemistry ensures that students will be given an opportunity to explore the material that is encountered in the classroom. The curiosity that leads to the discovery of new ideas within the classroom and laboratory environment carries over into the lives of students beyond the classroom. Many students within the program are involved in both weekend and summer research opportunities and also participate as volunteers in organized chemistry events. The experience and education afforded to students by the Chemistry Department provides for both academic and personal growth of students within the program, and creates an appreciation for learning that undoubtedly continues through the lives of students in the program.

Core Values

The Chemistry Department is proud of its accomplishments and, like the institution, strives to improve the program to enhance excellence in student learning. The Department recognizes the importance of the College's core values in achieving its vision and, to this end, encourages the faculty and students to: respect and value diversity, involve all in decision making processes, continue growing and learning, and value and promote the well-being of the local and campus communities.

[1] As will be reported in Section 2, the success rates for the chemistry program are higher than three of the four peer institutions identified in this Program Review.

The Chemistry Department respects and values the diversity of the entire community. The program consists of an ethnically and academically diverse group of thirteen full-time faculty and a pool of part-time faculty members (seventeen in Spring 2018), teaching four courses for non-majors and five courses for majors. The broad background and engagement of the faculty within the Department ensures that all constituents (i.e. staff, faculty, administration) are included in discussions surrounding important decisions. Furthermore, the faculty of the Department supports the involvement of all its members in the decision-making process; whereas individual contribution is welcomed and supported, the strength of the Department is realized in collaborative efforts.

The Chemistry Department emphasizes student success and academic achievement within a supportive learning environment. The personnel within the Department are respectful of all persons participating in the program and efforts are made to provide an environment conducive to strong academic scholarship and success. Students are closely connected to faculty and take advantage of many educational opportunities, adding value to their course experience.

The Chemistry Department is actively involved in special programs which promote the well-being of the local and campus communities. These programs include Project RAISE (Regional Alliance in STEM Education) weekend and summer research, bridge programs to California State University, Fullerton and University of California, Irvine. These opportunities provide students of varying backgrounds with different opportunities to succeed and excel in chemistry. Additionally, the faculty of the Department are involved in SI (Supplemental Instruction) and the development of PUMP (Peer Undergraduate Mentoring Program), aiding and encouraging students academically and providing an environment that promotes students to major in STEM fields.

College Goals

The Chemistry Department has reflected on the goals and outcomes of the program and how they relate to course-level assessments, modifications in methodologies, and approaches to the curriculum and program. The program goals, objectives, and strategies to achieve the objectives are all student-centered, and are driven by the desire to increase student success and reduce the achievement gap in the program:

Program Goals

The Chemistry Department will provide exceptional classroom and laboratory opportunities for students to achieve success in chemistry courses. Students will master content, develop critical thinking skills, communication skills, and technology skills using ethical standards to prepare them for professional careers and to be scientifically literate citizens. While being sensitive to the needs of all students, the program will pay attention to diversity, the underrepresented and underprepared students.

Program Objectives

1. Students will demonstrate in-depth knowledge of the principles of chemistry to solve multi-faceted scientific problems using critical thinking and quantitative reasoning skills.

2. Students will apply the necessary laboratory skills to answer questions of chemical relevance that synthesize classroom learned principles of chemistry with the experiments they conduct in the laboratory.

3. Students will engage collaboratively and independently in classroom and laboratory settings with integrity and honesty.

Strategies to Achieve Objectives

1. Choose textbooks, and select classroom and laboratory methodologies along with other instructional resources that are supported by evidence to improve student critical thinking and quantitative reasoning skills based on proven pedagogies.

2. Engage students with course material and technology relevant to their real-world experiences.

3. Provide an environment where students develop skills using safe laboratory practices and academic honesty.

4. Develop sustainable and green chemistry methods whenever possible.

Alignment of Program to Fullerton College Goals

The Chemistry Department program goals, objectives, and strategies to achieve the objectives support the College Goals through the promotion of student success, efforts to reduce the achievement gap, and the strengthening of its connections with the local community. The exceptional opportunities for students both in and out of the classroom and laboratory promote student retention and success, important for the underrepresented and underprepared students. The Department is well-aligned with College Goal 1 as the faculty in the program continually identify opportunities to increase student success, retention, and transfer through effective teaching strategies and by adhering to best practices as identified by the American Chemical Society. The efforts of the chemistry program are further highlighted by significantly increasing the number of chemistry sections supporting more STEM students, and by awarding significantly more degrees than the chemistry programs of peer institutions. Respecting the diversity of students in our courses, the faculty strive to reduce the achievement gap in College Goal 2 by treating students fairly and paying attention to students at risk. In alignment with College Goal 3, the program reaches out to the community in a variety of ways. For example, Chemistry for Daily Life (CHEM 100 F) students visit a 5th grade class and conduct experiments with the elementary school students and motivate them to consider science courses as they move on in their studies. Furthermore, the Chemistry Department is actively involved in community outreach with faculty providing hands-on activities for children at the Santa Ana Zoo and at Miramar College during the American Chemical Society's celebration of National Chemistry Week and KinderCaminata. Students within the program are encouraged to become actively involved in these community programs, and are also directed toward research programs at local four-year institutions, e.g. Project RAISE (Regional Alliance in STEM Education) at California State University, Fullerton.

2.0 Program Data & Trends Analysis

2.1 Key Performance Indicators (KPI)

The Office of Institutional Research and Planning (OIRP) provided access to the *Tableau* portal where the Chemistry Department accessed five-year longitudinal data. This data, as seen in Appendix A, shows the effects of expanding the chemistry offerings to help mitigate the backlog of students due in part to the previous budget cuts to the Chemistry Department which resulted from the recession that ended in 2012. The increase in number of sections offered has required realignment of laboratory facilities, an increase in Chemical Stockroom costs, as well as retaining a large number of adjunct faculty (seventeen in Spring 2018). Despite these growing pains, the impact on success and retention rates have been negligible. This is a testament to the commitment and determination of the faculty and staff of the Chemistry Department. The program statistics are presented below.

The five-year period is defined from academic year[2] (AY) 2013-2017.

Table 2.1: Annual KPI Data

KPI	2013	2014	2015	2016	2017
Enrollment	1437	1587	1843	1847	2127
Total FTES	386.5	411.3	480.7	504.7	594.9
Sections	60	65	76	78	90
Fill Rate	100.4%	102.7%	104.1%	97.6%	97.9%
FTEF	27.85	30.33	35.17	36.48	41.93
WSCH/FTEF	407.6	390.8	406.6	404.7	416.3
Retention	84.2%	83.8%	83.0%	82.8%	84.0%
Success	73.8%	73.7%	72.9%	72.3%	72.6%

Enrollment

Student enrollment increased by an average of 51.0 students per year. Fill rates ranged from 97.6% to 104.1%.

Total FTES

The total full-time equivalent students (FTES) statistic is directly related to enrollment and therefore these values also increased during the five-year period presented in the longitudinal data. The average total FTES for the last five years is 475.6 FTES, ranging from 386.5 to 594.9 FTES. This represents an average growth of 11.5%. For the 2014 Chemistry Program Review, the Chemistry Department predicted a growth in the total FTES of 60+ FTES (15%) for AY 2015; FTES growth exceeded predictions, increasing by 69.4 and representing a growth of 16.9%. AY 2017 experienced an even higher growth of 17.9% compared to AY 2016, for a total growth of 53.9% over the five-year period.

[2] Academic year is defined as the Summer term of previous year to Spring term of labeled year.

Sections

The five-year longitudinal data presents the same trend in the total section count as seen with both the enrollment and total FTES data. Since the AY 2013, the number of sections offered by the Chemistry Department has increased significantly. There has been a net increase of 50% in the total number of sections offered in AY 2017 compared to AY 2013. The courses with the greatest increase in section offerings have been Chemistry for Allied Health Science (CHEM 101 F), Preparation for General Chemistry (CHEM 107 F), and General Chemistry I (CHEM 111AF), with increases of 71%, 75%, and 54%, respectively.

Fill Rate

The average fill rate for courses in the program has remained strong over the last five years. The range in fill rates and average fill rate were 97.6% to 104.1% and 100.5%, respectively. While the decline in enrollment could be cause for concern in AY 2016 and 2017, the numbers do not suggest that the program has met demand. Overall enrollment at the College during the five-year period declined by a larger amount; this indicates that the courses offered by the Chemistry Department are always in high demand and suggests that a need for continued growth in the Department still exists.

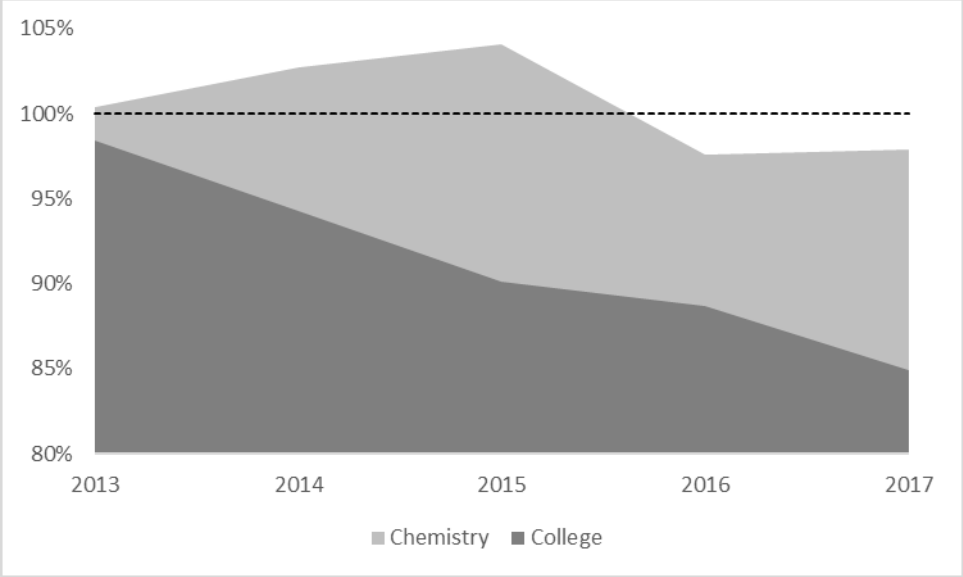

Figure 1: Annual Census Fill Rate for the Chemistry Department and Fullerton College. The Chemistry Department had an average fill rate of 100.5%, with a low of 97.6% and a high of 104.1%. The College has seen a steady decline in fill rate, with a low of 84.9% for AY 2017.

WSCH/FTEF

The annual ratio of weekly student contact hours (WSCH) to full-time equivalent faculty (FTEF) averaged 415.8 over the last five years; the College-wide ratio over the same period is about 474.4, with a standard target ratio of 525. The standard target ratio is based on a class size of 35; since most of chemistry courses have seat counts of 25 due to extensive individualized instruction and laboratory safety considerations, the expected WSCH/FTEF ratio for the chemistry courses is around 375. When compared to this scaled value, the chemistry program has exceeded target ratio by 10.9%.

Retention

The retention rate[3] of students within the chemistry program averaged[4] 83.5% with a standard deviation[5] of 0.6% over the five-year period, indicating very low year-to-year variance in student retention.

Success

The success rate[6] of students within the chemistry program averaged 73.0% with a standard deviation of 0.6% over the five-year period, indicating very low year-to-year variance in student success.

2.2 Peer Institution Comparison

The comparable institutions identified by the Office of Institutional Research and Planning (OIRP) are the same as those used in the previous program review (2014). These institutions include Los Angeles City College, Modesto Junior College, San Diego Mesa College and Santa Barbara City College. The average annual retention and success rates for Fullerton College are 83.5 ± 0.6% and 73.0 ± 0.6%, respectively, while the average annual retention and success rates over for the peer institutions selected are 85.9 ± 1.0% and 73.1 ± 0.6%, respectively. All five colleges have significantly different retention and success rates from each other, but all fall within the 95% confidence interval for the state overall. [7,8]

When examining retention rates, Modesto Junior College had significantly lower retention rates than Fullerton College, while San Diego Mesa College and Santa Barbara City College had significantly higher retention rates ($p < 0.05$).

However, when examining success rates only Modesto Junior College had significantly lower success rates than the remaining institutions, including Fullerton College ($p < 0.05$).[7] Fullerton College had higher success rates than average over the five-year period.

Table 2.2: 5-Year Peer Institution Success and Retention

College/Program:	Retention	Success	Degrees	Enrollment
Fullerton	83.5 ± 0.6%	73.0 ± 0.6%	167	8841
LA City	79.4 ± 2.4%	70.4 ± 2.7%	14	5475
Modesto	77.9 ± 1.4%	59.4 ± 2.9%	75	7900
San Diego Mesa	88.3 ± 1.2%	76.9 ± 1.1%	18	25635
Santa Barbara	90.4 ± 1.3%	76.0 ± 1.5%	92	8395

[3] Retention rate is defined as the percentage of students who did not drop from the course compared to those enrolled at time of census.

[4] All averages are reported as weighted averages, with student enrollment as weight.

[5] All standard deviations are reported weighted standard deviations, with student enrollment as weight.

[6] Success rate is defined as the percentage of students who received a passing grade (A, B, C, P, IA, IB, IC, IPP) compared to those enrolled at time of census.

[7] See Appendix Section for CCCCO data

[8] See Appendix Section for statistical analyses for peer institutions

Table 2.3: Annual Peer Institution Retention Rates

College/Program:	2013	2014	2015	2016	2017	5-Yr Total
Fullerton	84.2%	83.8%	83.0%	82.8%	84.0%	83.5%
LA City	83.0%	77.2%	79.4%	80.6%	76.9%	79.4%
Modesto	77.7%	75.6%	78.4%	79.4%	77.9%	77.9%
San Diego Mesa	89.6%	86.8%	88.0%	87.6%	89.5%	88.3%
Santa Barbara	89.0%	89.5%	90.0%	91.1%	92.3%	90.4%

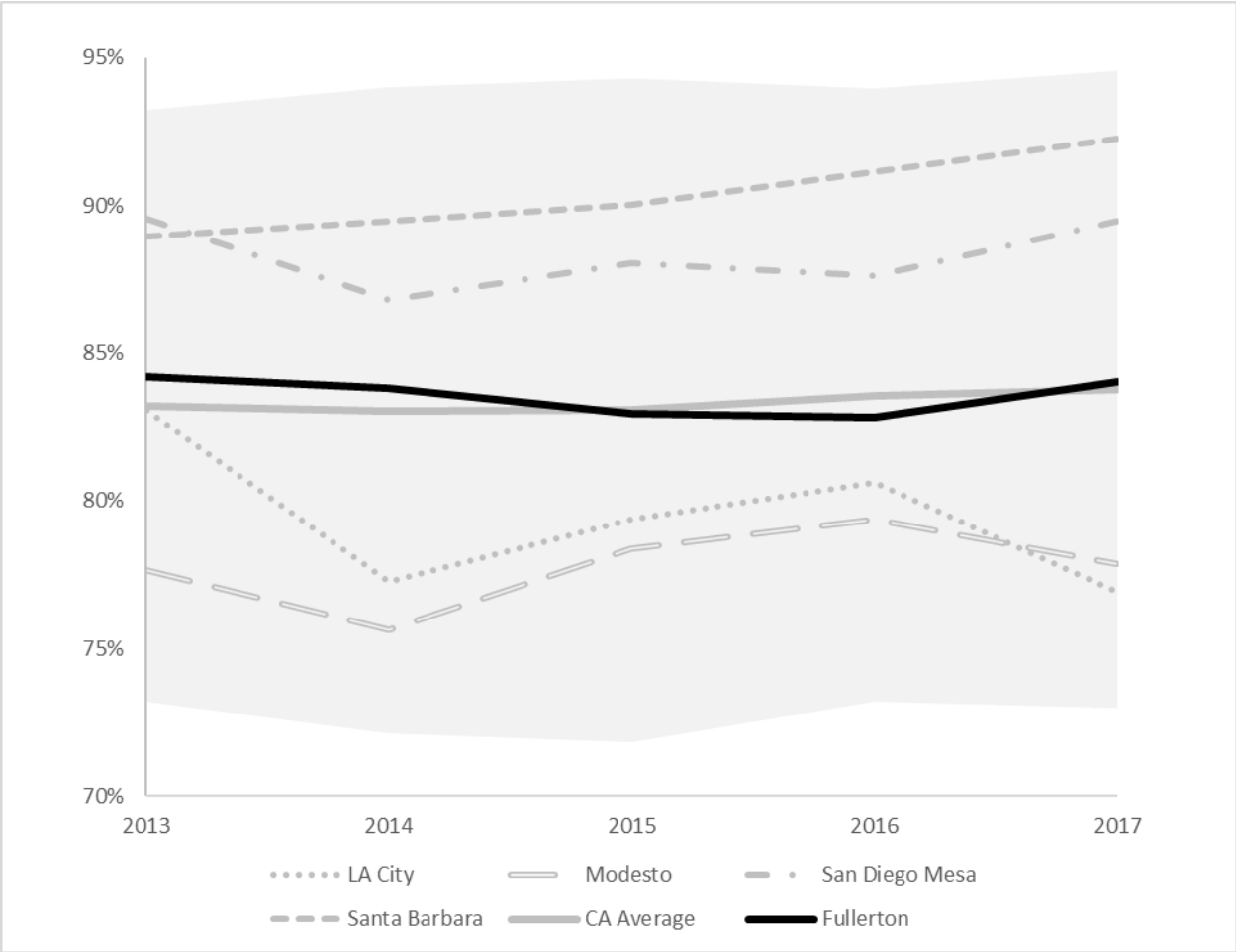

Figure 2.2: Annual retention rates for Fullerton College and selected peer institutions. The gray shaded area is the 95% confidence interval for statewide retention rates for the specified academic year. Fullerton College's annual retention rates are very similar to the state average. Retention is also statistically homogeneous to LA City College, but significantly different from Modesto Junior College, San Diego Mesa College, and Santa Barbara City College.

Table 2.4: Annual Peer Institution Success Rates

College/Program:	2013	2014	2015	2016	2017	5-Yr Total
Fullerton	73.8%	73.7%	72.9%	72.3%	72.6%	73.0%
LA City	73.4%	68.1%	69.0%	73.3%	68.5%	73.4%
Modesto	57.7%	56.8%	57.6%	63.3%	59.9%	57.7%
San Diego Mesa	77.8%	75.7%	77.6%	75.7%	77.7%	77.8%
Santa Barbara	75.4%	78.7%	75.0%	75.7%	75.4%	75.4%

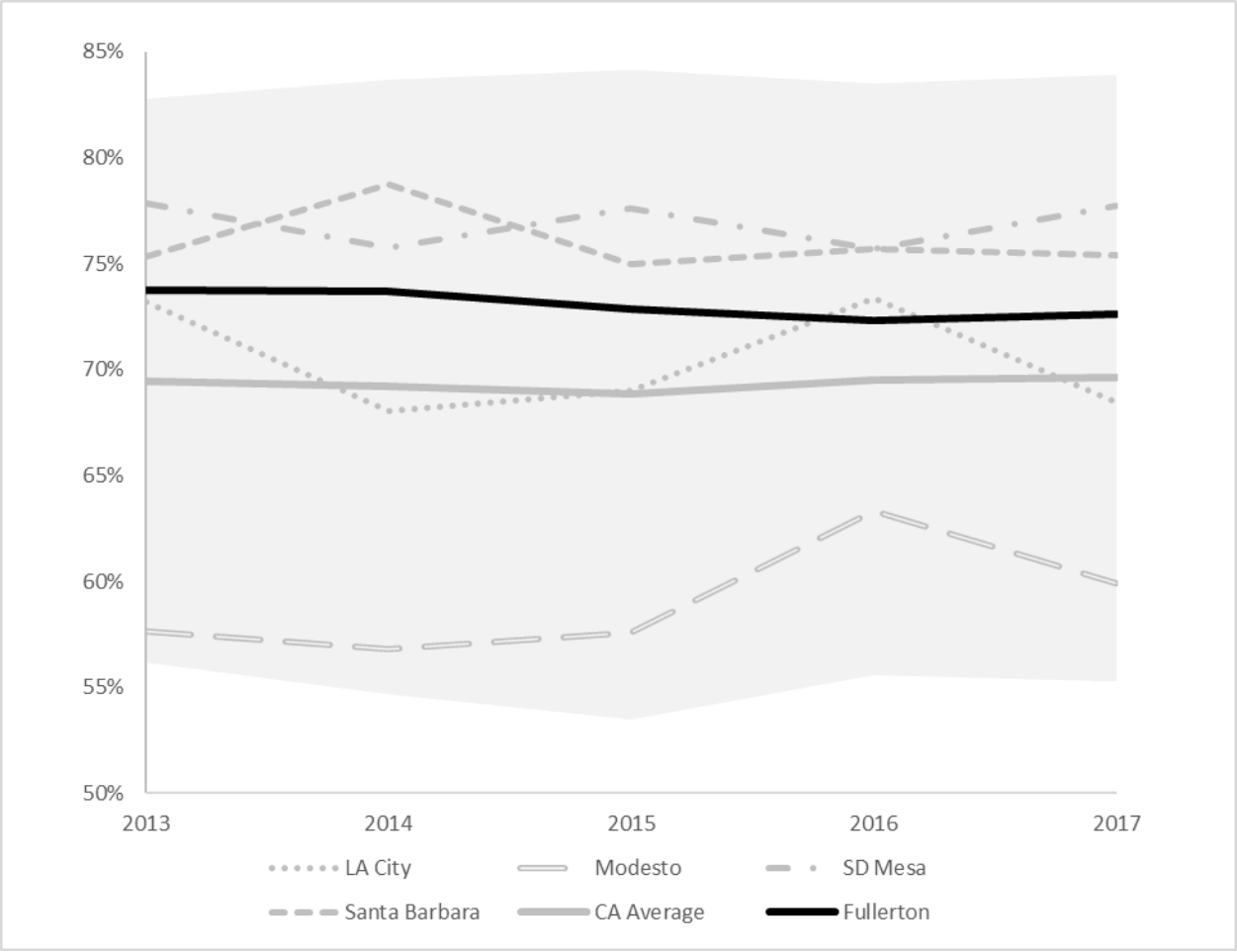

Figure 2.3: Annual success rates for Fullerton College and selected peer institutions. The gray shaded area is the 95% confidence interval for statewide retention rates for that specified academic year. Fullerton College was statistically homogeneous with LA City College, San Diego Mesa College, and Santa Barbara City College, but significantly different from Modesto Junior College.

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Success rates within the chemistry programs at Fullerton College and the four peer institutions may be related to the shifting ethnic demographics of chemistry students as well as those of their surrounding communities. In the five-year period examined, the proportion of Hispanic students enrolled in chemistry programs have steadily increased.[9] Los Angeles City College, Modesto Junior College, and Fullerton College all have higher annual Hispanic populations (41.5%, 42.7%, 42.4%) compared to San Diego Mesa College (31.4%) and Santa Barbara City College (34.6%). As San Diego Mesa College and Santa Barbara City College have higher success rates among this five-institution cohort, these numbers indicate a negative correlation between overall program success and percent Hispanic population. Furthermore, this suggests that the overall success rates of Hispanic students are less than that of other large demographics.

However, overall success rates do not seem to be undergoing a statewide decline. Since Hispanic students make up such a significant portion of our program's demographic, further investigation is required to determine whether Hispanic students in our program are improving every year– especially if they are disproportionately less successful than Hispanic chemistry students across the state. This is discussed in Section 2.3.

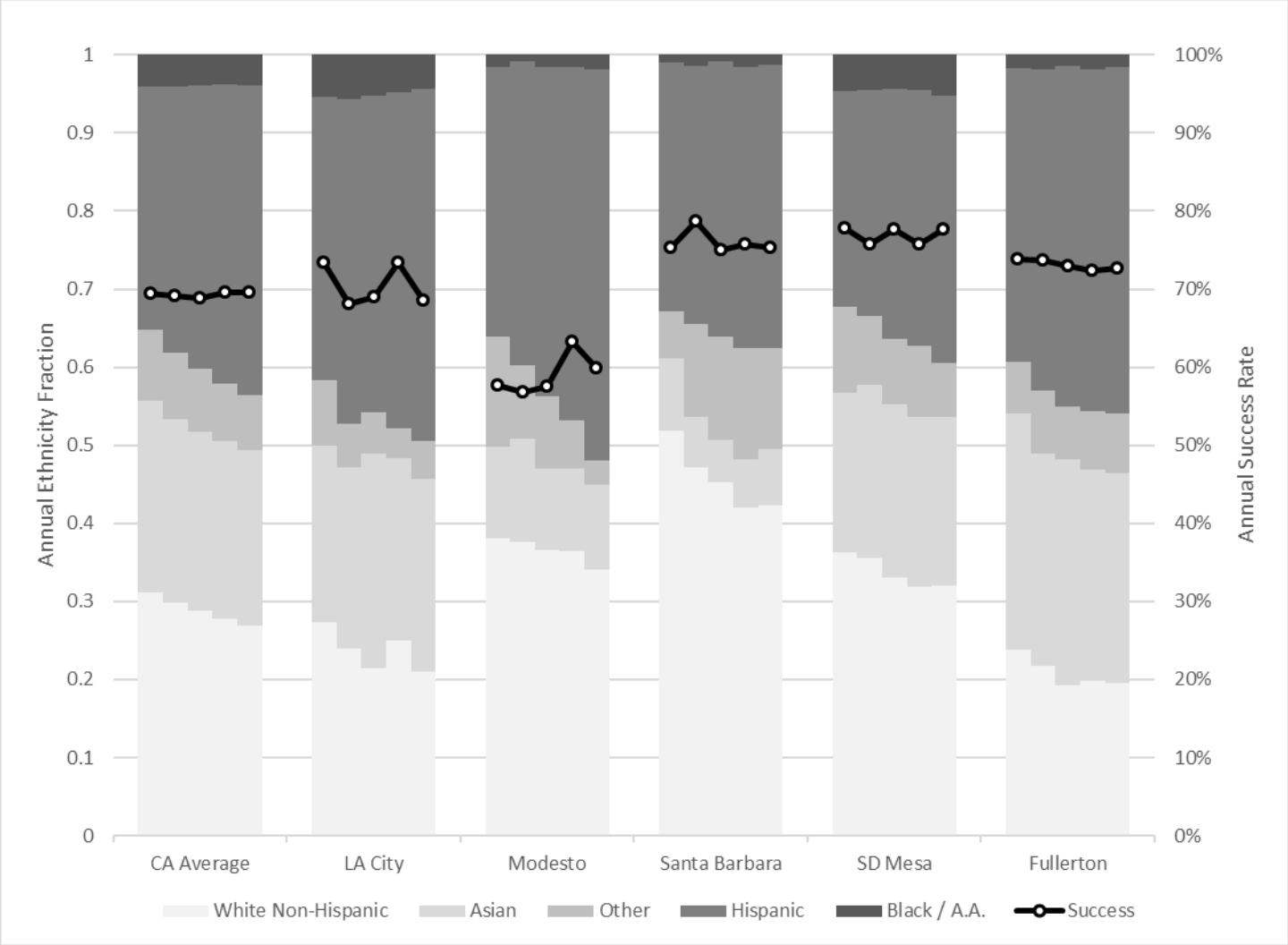


Figure 2.4: Annual Ethnicity Fraction and Success Rate, from AY 2013-2017. Each chemistry program has an increasing Hispanic enrollment concurrent with decreasing White student enrollment.

[9] Complete annual ethnic breakdown of peer institutions is provided in the appendix.

The strength of the program when compared to the peer institutions is conveyed not only by Fullerton College's success rates, but also by the number of awarded degrees. As seen in Table 2.5, Fullerton College awarded a larger number of associate degrees in chemistry than the identified peer institutions even when scaled for size of each program (degrees per 1000 students). Additionally, there has been a clear increase in the number associate degrees in chemistry awarded by Fullerton College. From 2013 to 2017 the number of awarded associate degrees in chemistry increased by over 300%. Finally, as the number of majors within the program average about 190 each academic year, it is likely that many students are transferring prior to receiving a degree.

Table 2.5: Annual Degrees Awarded per 1000 students

College/Program:	2013	2014	2015	2016	2017	5-Yr Total
Fullerton	18.1	20.8	22.8	21.7	12.2	18.9
LA City	4.3	0.9	3.5	1.6	2.7	2.6
Modesto	5.9	9.6	9.0	10.3	11.7	9.5
San Diego Mesa	1.1	0.9	0.6	0.4	0.7	0.7
Santa Barbara	9.9	7.1	11.7	12.3	13.5	11.0

Furthermore, there is precedent to investigate the difference between success and retention to gain more insight to how the program is performing. The difference between success and retention – the percent of students who are unsuccessful in their courses – could reveal weaknesses in each program. In particular, while Santa Barbara City College's chemistry program retention rates have been higher than average, their success rates have been comparable. This means that a significant portion of students at Santa Barbara City College are unsuccessful, with rates approaching that of Modesto Junior College for AY 2016 and 2017 (close to 17% in AY 2017).

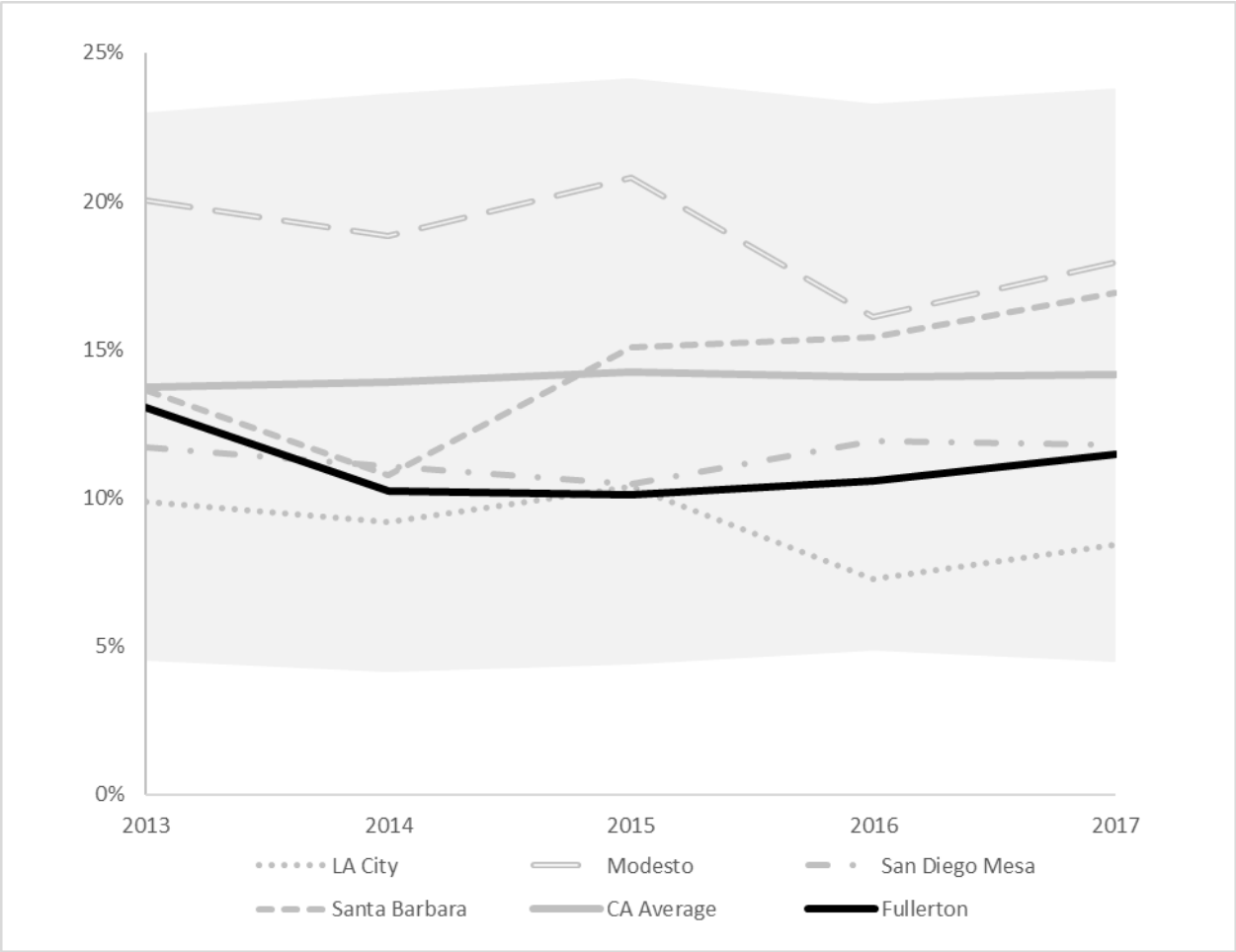


Figure 2.5: Annual difference in Success and Retention rates for Fullerton College and selected peer institutions. The gray shaded area is the 95% confidence interval for statewide rates for that specified academic year. Fullerton College has much lower rates, while Santa Barbara City College has higher-than-average rates.

Chemistry students at Fullerton College not only have lower failure rates than that of ostensibly better-performing programs such as Santa Barbara City College, but have significantly lower failure rates than the state overall. Together with the high number of degrees awarded per enrollment, high fill rates, and high WSCH/FTEF, the Chemistry Department is performing very well.

2.3 Achievement Gap

The KPI Report provided by the OIRP provides the relative retention and success for each of the demographic cohorts (gender and ethnicity)[10] within the program. The values for retention and success by gender cohort as presented within the KPI report appear below in Table 2.6 and Table 2.7, respectively. With respect to gender, it is clear from the retention and success data that the male and female student populations are performing equally well.

Table 2.6: Annual Retention Rates by Gender Cohort

Retention	2013	2014	2015	2016	2017	5-Yr Total
Female	84.5%	83.5%	82.4%	82.8%	85.4%	84.5%
Male	83.9%	84.1%	83.3%	82.7%	82.5%	83.9%

Table 2.7: Annual Success Rates by Gender Cohort

Success	2013	2014	2015	2016	2017	5-Yr Total
Female	74.5%	74.4%	73.1%	71.7%	73.1%	74.5%
Male	73.2%	73.1%	72.5%	72.8%	71.8%	73.2%

However, the values for retention and success by ethnic cohort, as presented within the KPI report, reveal larger disproportionalities. To better-evaluate potential weaknesses, opportunities for growth, and challenges within the program, The Chemistry Department proposes two new metrics for analyzing KPI data, which frames our focus on students who are at risk of not succeeding:

1. Failure, defined as the difference between retention rate and success rate. This describes the percentage of students who receive either a failing grade (D or F) at the end of the semester or they withdraw from the course.
2. Withdrawal, defined as the difference between total student enrollment and retention rate. This describes the percentage of students who initially sign up for courses but drop them, either before or after the last day to drop but before the last day to withdraw.

Using these new parameters, the sum of success, failure, and withdrawal rates is total enrollment. This gives us a three-category split between students – instead of the two-category split of “successful” and “not successful” – which will allow for a more granular approach to helping students who have disproportionately low success rates.

Table 2.8: Annual Retention, Success, Withdrawal, and Failure Rates

Fullerton	2013	2014	2015	2016	2017	5-Yr Total
Retention	84.2%	83.8%	83.0%	82.8%	84.0%	83.5%
Success	73.8%	73.7%	72.9%	72.3%	72.6%	73.0%
Failure	10.4%	10.1%	10.1%	10.5%	11.4%	10.6%
Withdrawal	15.8%	16.2%	17.0%	17.2%	16.0%	16.5%

[10] For the remaining analyses, the following cohorts are excluded from display due to their low enrollment: Native American / Alaskan Native, all genders (n = 16); Hawaiian Native / Pacific Islander, all genders (n = 28); Different / Unknown gender, all ethnicities (n = 106). Tables and figures that say “All Others” include these cohorts. Their individual data can be found in the Appendix section.

When looking at rates within each ethnicity cohort, it becomes clearer that Black / African-American students and Hispanic students have higher-than-average combined withdrawal and failure rates. Out of all the ethnic cohorts with significant student populations, only the Hispanic cohort has higher-than-average withdrawal rates. That students of Hispanic descent are almost 20% likely to withdraw from a course and that students of Black / African-American descent are 20% likely to fail a course are areas of concern for the Chemistry Department.

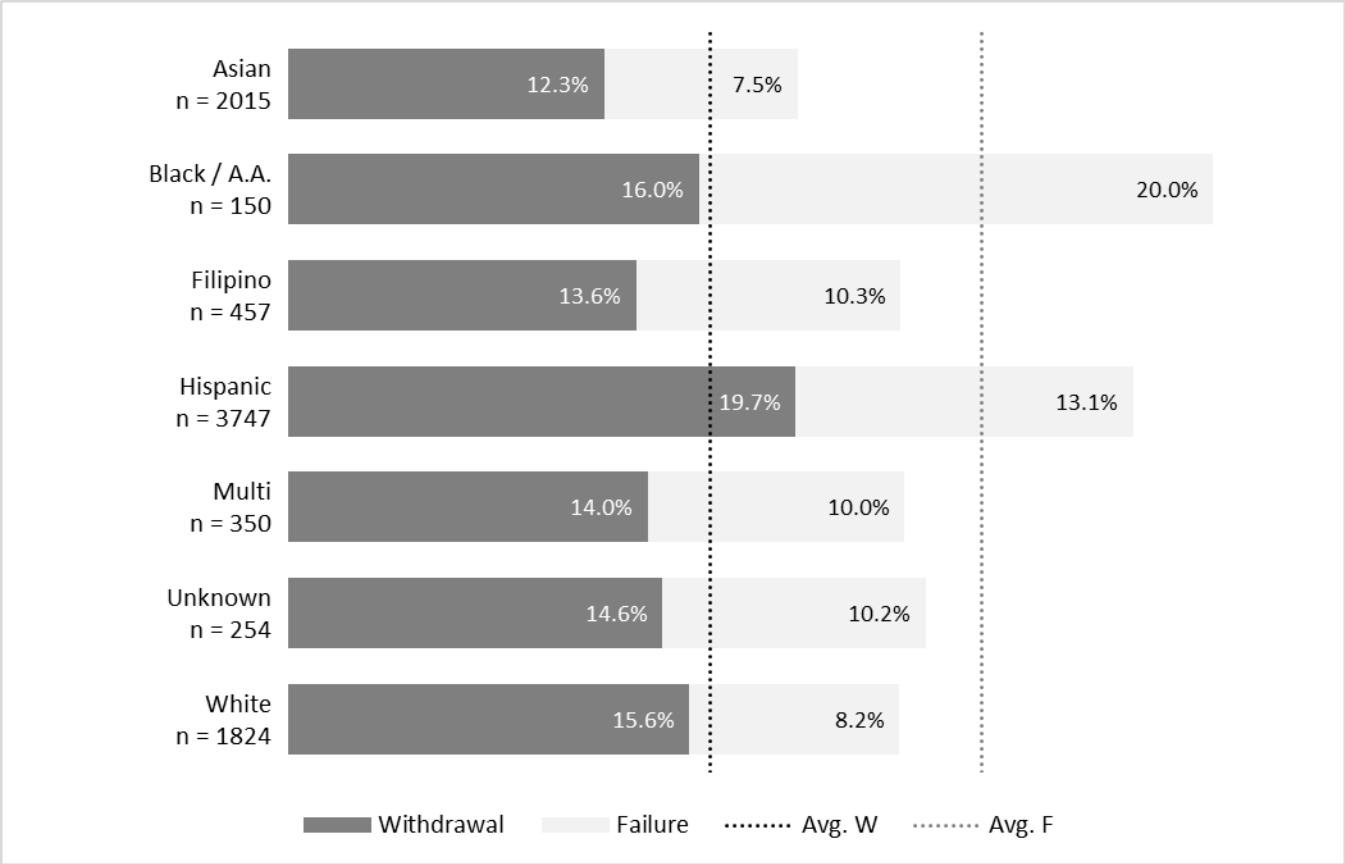


Figure 2.6: Five-Year Withdrawal and Failure Rates by Ethnicity Cohort. College-wide average withdrawal and failure rates are shown as the dotted lines.

Even though male and female students perform very similarly overall, there are some wide discrepancies in certain ethnic cohorts. Of interest is the fact that almost half of Black / African-American male students do not succeed, with over 20% withdrawing from courses and over 25% failing from courses. In contrast, Black / African-American female students have a lower-than-average combined withdrawal and failure rate.

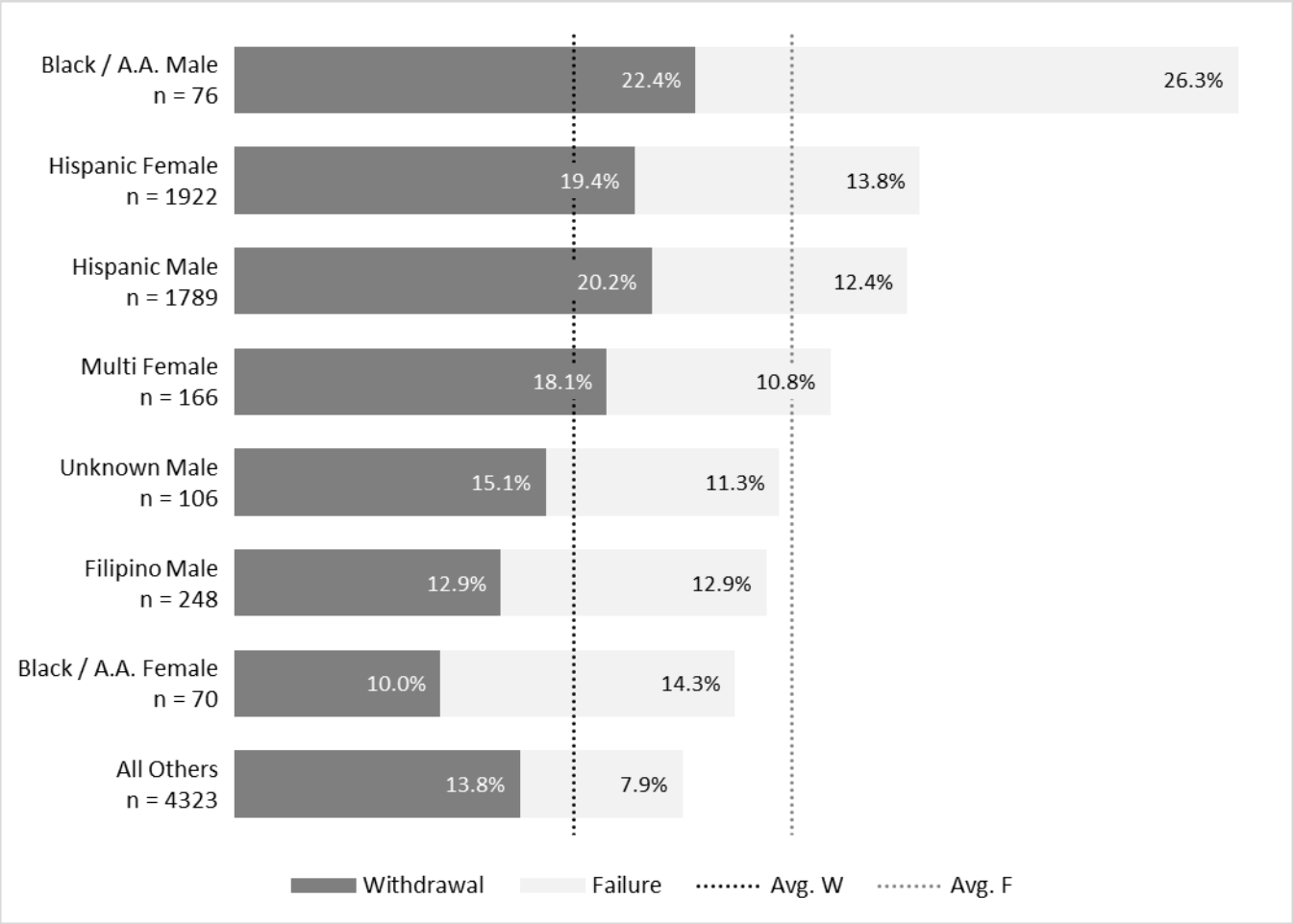


Figure 2.7: Five-Year Withdrawal and Failure Rates by Ethnicity/Gender Cohort. Black / African-American Male, Hispanic Male, Hispanic Female, and Multi-Ethnic Female cohorts all have higher-than-average withdrawal rates.

The Hispanic Female and Hispanic Male cohorts have similarly high rates of withdrawal and failure. While the Multi-Ethnic Male cohort (not pictured) has a withdrawal rate of just 9.7% and a failure rate of 8.5%, the Multi-Ethnic Female cohort has rates of withdrawal and failure higher than that of average. All other groups fall below average rates of withdrawal and failure.

When examining difference according to age[11], we see a general trend that older students are more likely to withdraw from courses, but overall are slightly less likely to fail.

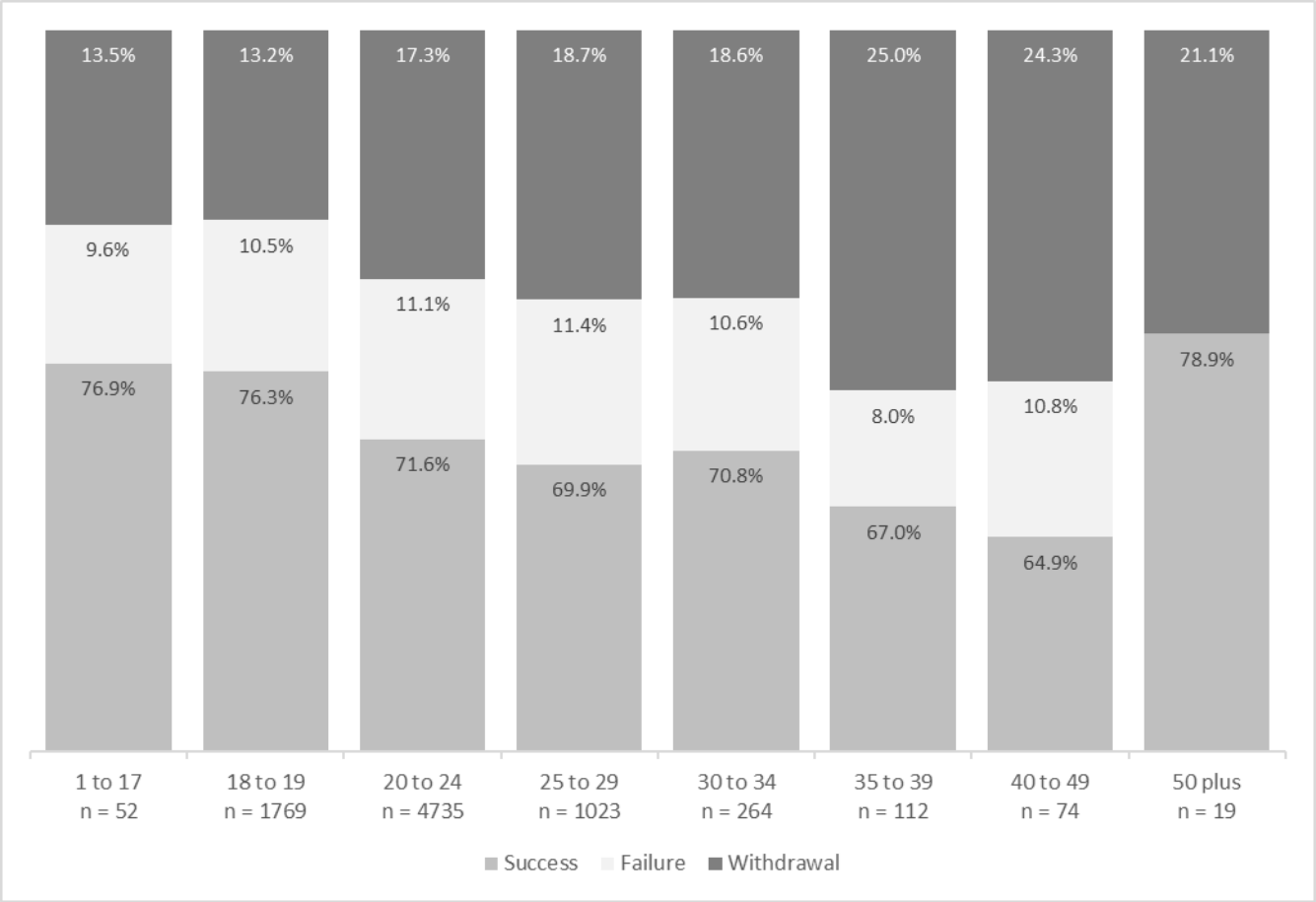


Figure 2.8: Five-Year Success, Withdrawal, and Failure Rates by Age Group. In general, older students tend to withdraw from classes more frequently, but a greater proportion of those who stay enrolled relative to census tend to pass their courses.

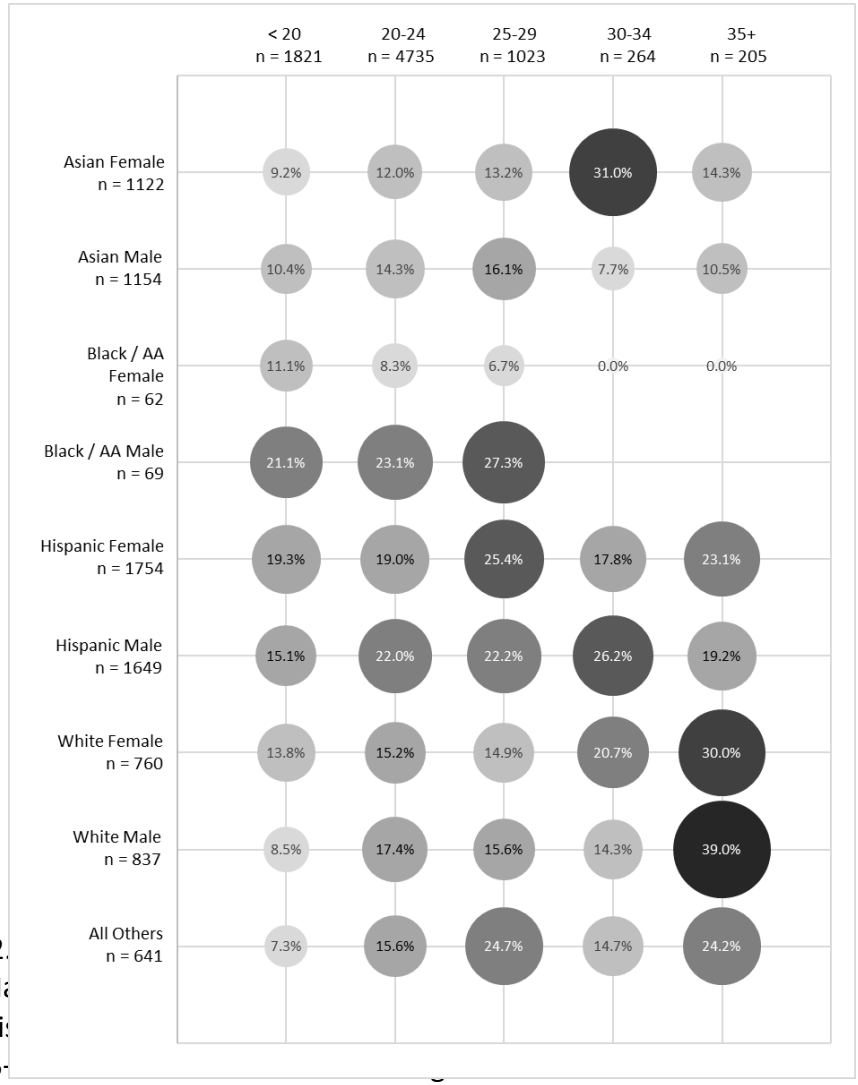
However, when further categorized by ethnicity and gender, several notable trends arise:

1. Black / African-American male cohort and both Hispanic cohorts are most likely to withdraw or fail across all age groups.

2. Asian Females aged 30-34, Hispanic Females aged 25-29, and White Females aged 30+ all have higher-than-average withdrawal rates. However, Asian Females and White Females both have much lower than average failure rates.

3. Black / African-American Females aged 30-34 also have disproportionately high failure rates, although this could be because of low enrollment numbers.

[11] Data collected from CCCCO, which has different enrollment numbers when broken down by age.



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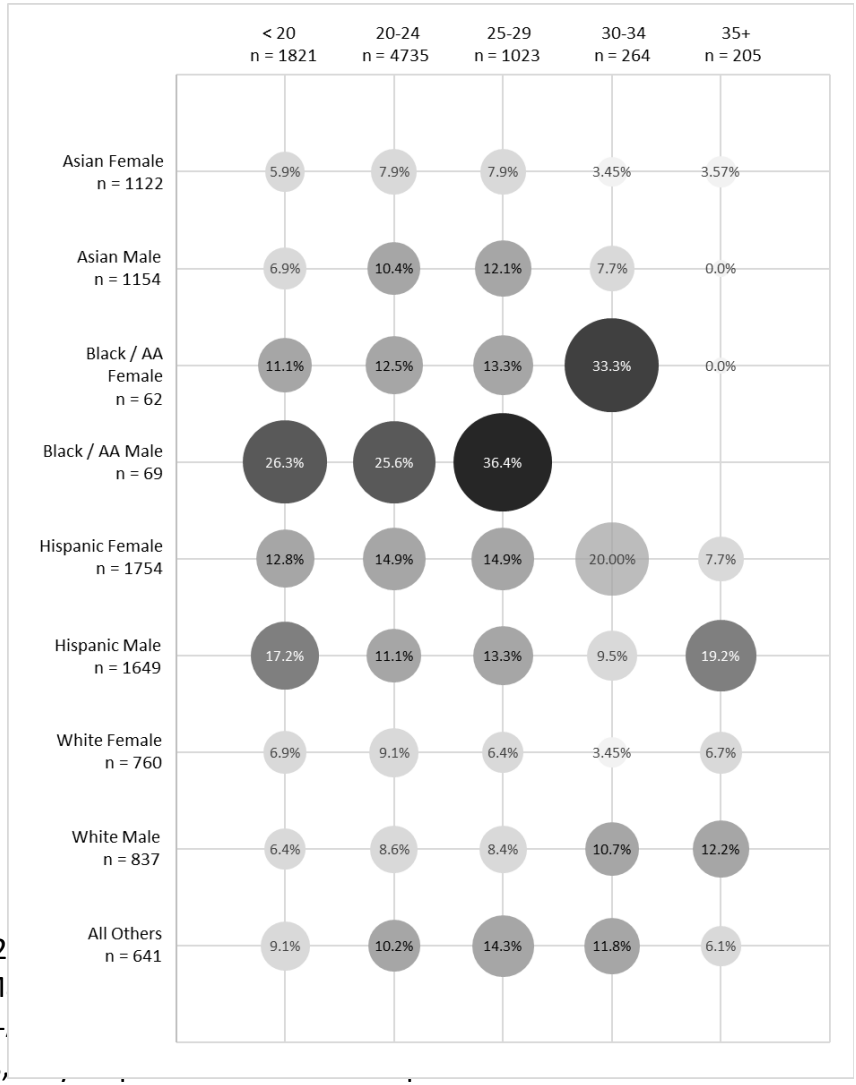

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consistently high rates of failure, although those aged 35+ and 30-34, respectively, do significantly better than average.

More severe patterns in disproportionality arise when comparing failure and withdrawal at Fullerton College compared to the state. A greater percentage of Black / African-American students and Hispanic students are succeeding in the College's program compared to the State (64.0% vs. 58.0%; 64.3% vs. 62.7%, respectively), but that does not take into account that the College has higher success rates overall (73.0% vs. 69.3%).

State-wide, Black / African-American students make up 3.9% of those enrolled in chemistry, 5.5% of the students who fail, and 5.3% of the students who withdraw. At Fullerton College, Black / African-American students make up 1.7% of those who enroll, yet 3.2% of those who fail and 1.6% of those who withdraw. So, while the average Black / African-American student is 39.2% more likely to fail than the average chemistry student state-wide, the average Black / African-American student at Fullerton College is 89.5% more likely to fail than the average Fullerton College chemistry student.

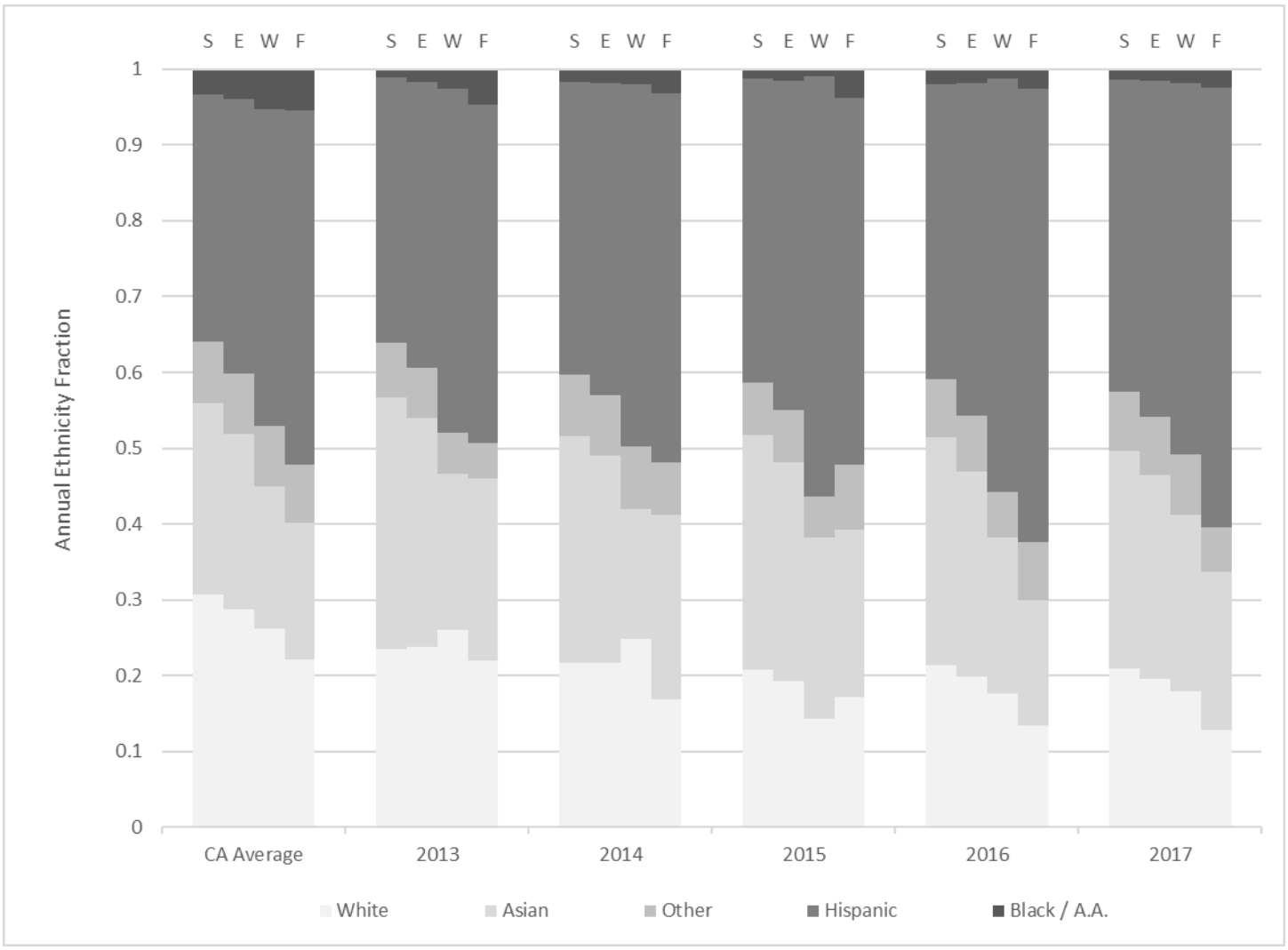
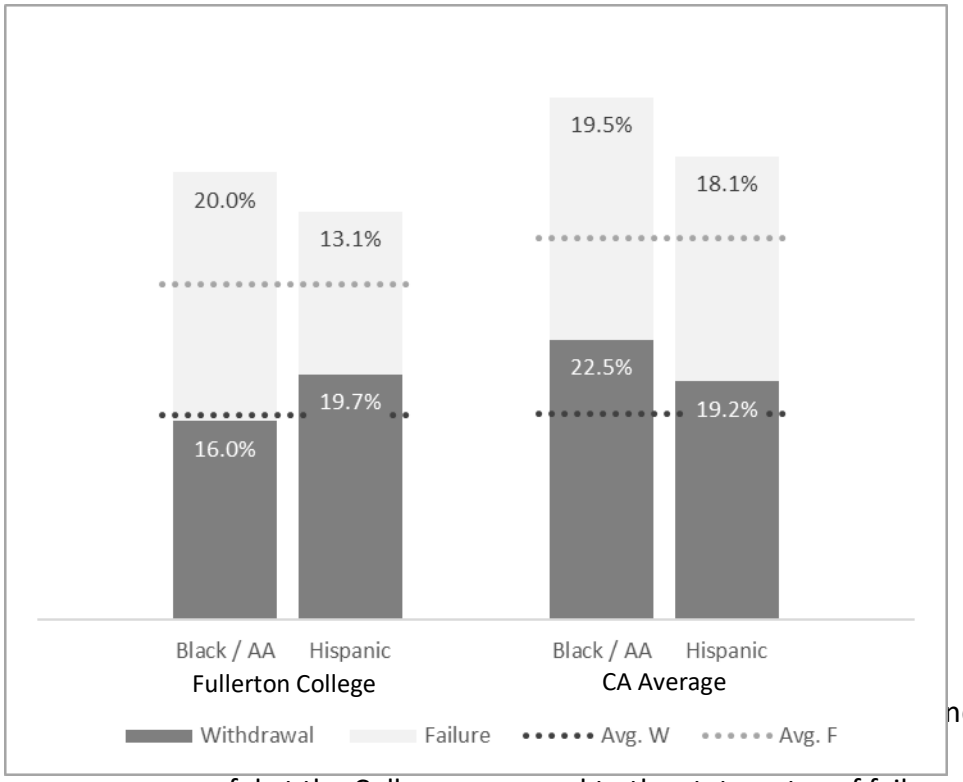


Figure 2.11: Ethnicity Percentages[12] of Success, Enrollment, Withdrawal, and Failure, by Academic Year at Fullerton College. The Hispanic and Black / African-American cohorts consistently make up a greater proportion of students who withdraw or fail from courses per year.

[12] For each parameter Success, Enrollment, Withdrawal, and Failure, total number of students for each of the five cohorts – White, Asian, Hispanic, Black / A.A., and all others – was divided by the total number of students who were succeeded, enrolled, withdrew, or failed.



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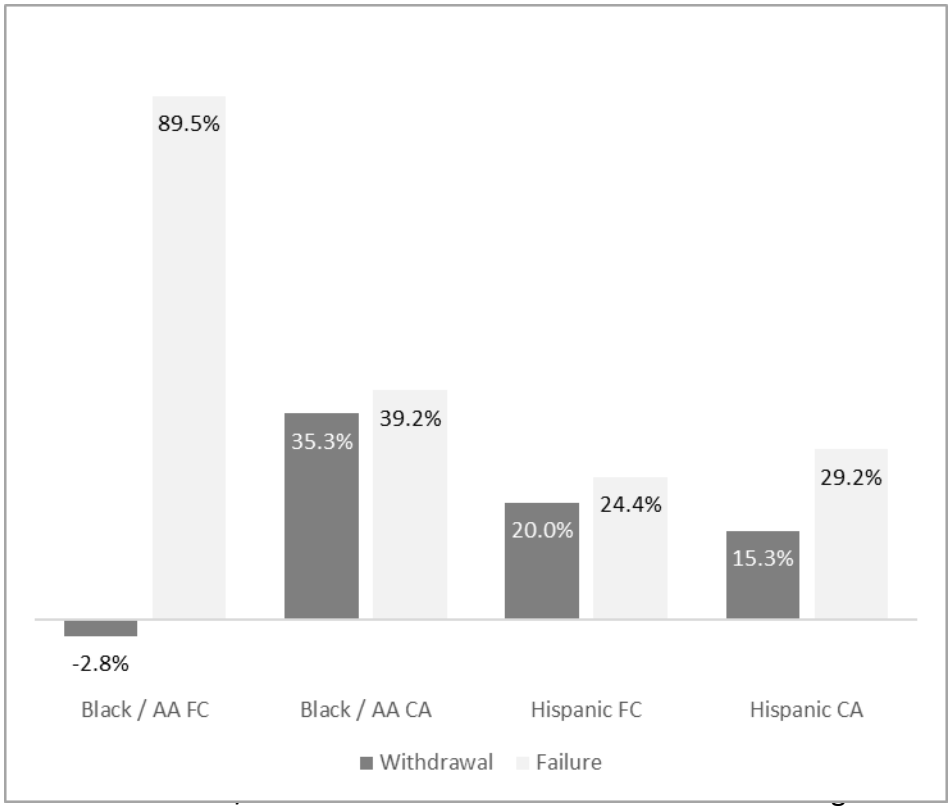
are more successful at the College compared to the state, rates of failure for Black / African-American students is far higher than the rate of failure for the average student at Fullerton College.



are far more likely to fail than the average Fullerton College student, while they are 39.2% more likely to fail than the average student state-wide, a smaller disproportion.

2.4 Program Effectiveness

Significant changes that have occurred that impact the effectiveness of the program:

1. Enrollment increases

The enrollment of students in chemistry courses increased from 1437 in 2013 to 2127 in 2017. This increase of 48% has had a great impact on our program. We increased course offerings from 60 sections to 90 sections to accommodate these students. It was a challenge to increase our chemistry offerings because almost all the chemistry courses have a laboratory component, and laboratory space is limited. Even with this increase in course offerings, the chemistry department has a 100% fill rate; and we still turn away students each semester. The increase in enrollment has decreased the time it takes students to progress toward their goals of earning STEM degrees and for transfer. In 2013, it was common for students to wait 1-2 years before enrolling in CHEM 107 F because it was so heavily impacted.

Last year, the Department worked with Chemistry Stockroom Staff, and other Natural Science department coordinators to completely overhaul our lab schedules to maximize efficiency for using our current laboratory space. Our limited laboratory space has made increasing sections any further nearly impossible; for this reason we are requesting additional facilities in Section 6.

2. Full-time faculty changes

In 2013, there were eight full-time faculty, and now we have thirteen. While the additional faculty is helpful, we still require seventeen adjunct faculty in order to staff our course offerings.

Since 2013, we have had one retirement, Dr. Jan Chadwick in December 2016, who was very active in our Department and on campus. Also, Dr. Sam Foster had served as Faculty Senate president, which carries a 4-year commitment and significant reassigned time, and Mr. Guy Dadson represents the Natural Science Division on both the curriculum committee and United Faculty, is also receiving reassigned time. We are happy to have Dr. Foster return to teaching, but he is currently serving on the State Academic Senate, so he has not returned to full-time teaching yet. The NOCCCD offer of the SERP (Supplemental Employee Retirement Plan) may also affect our number of full-time faculty.

3. Hiring of Natural Sciences Dean

The current Dean of the Natural Sciences Division, Dr. Richard Hartmann was hired in January 2015, after nearly a decade of temporary deans. Having a dean of the division has had a large impact on our Department. Having a dedicated advocate for the division has improved all aspects of Natural Sciences on our campus. We have more stability and focus than when we had temporary deans. Dr. Hartmann has successfully coordinated with CSUF and the project RAISE grant, funding many of Division activities, including the chemistry Boot Camps

4. Interventions to improve Student Success

A) Supplemental instruction increases and change to student-leader model

The Department has increased the number of class sessions that include a Supplemental Instruction (SI) component. Over the last few years, we have transitioned from SI sessions held by faculty members to SI sessions held by student leaders. Our campus SI program trains these students. This transition occurred when funding changed from an external grant, the ENGAGE in STEM grant, to the institutionalized SI program administered by the College. We hope to continue to work within this program and to further expand sessions that utilize SI.

B) ENGAGE grant FYE cohorts now institutionalized to STEM cohorts

The ENGAGE in STEM grant supported many of our activities in chemistry. One part of the program was the FYE, First Year Experience. Students in FYE were selected and were guaranteed enrollment in CHEM 107 F or CHEM 111AF during their freshman year. This program was so successful that when the grant terminated, Fullerton College continued the program as the STEM cohorts. We currently have several cohorts and are expanding availability beyond first-year courses.

C) Boot Camps increase, and change from ENGAGE grant to RAISE grant

The department has increased the number of classes that have a Boot Camp associated with it. Boot Camps are workshops held just before the semester begins (or shorty after). Students review topics that faculty have determined are roadblocks for success in the course. We first began offering Boot Camps for CHEM 107 F as part of the FYE program around 2011. It has since changed funding from GPS2 grant, to ENGAGE in STEM grant, to Student Equity funding, to the project RAISE grant. We are hoping that Boot Camps will soon be institutionalized, so that we do not have to continuously hunt for external funding. Boot Camp success is discussed in Section 5.

D) Peer Undergraduate Mentoring Program (PUMP

The Peer Undergraduate Mentoring Program (PUMP) pairs first year FC STEM students with academically outstanding STEM students from California State University, Fullerton. The intent of PUMP is to improve the study strategies of first-year college students through a student/peer-mentoring program.

2.5 Describe any laws, regulations, trends, policies, procedures or other influences that have an impact on the effectiveness of your program. Please include any other data (internal or external) that may be relevant to student achievement, learning, and trends within your Basic Skills, CTE, or Transfer Education programs.

1. **The Governor Signed AB705**

   The new law AB705 changes the way students are placed in math. As nearly all of our courses have a math prerequisite, the use of guided self-placement or high school transcript data to comply with this new law may cause students to be placed in courses that meet our prerequisites without having the math currency necessary to successfully navigate the rigors of our courses. Of particular concern is the Math 040 F (intermediate algebra) prerequisite for CHEM 101 F, CHEM 107 F and CHEM 111AF. Under this new law it is possible that students may meet the prerequisite for one of these courses based on transcript data or guided self-placement and be underprepared for the math rigors of these courses, especially if they are not concurrently enrolled in a math course and their math skill are not current. This has the risk of leading to much lower success rates in those classes. This will need to be analyzed and an appropriate intervention created if necessary

2. **The Push Toward a Guided Pathways Model**

   There is a movement toward a guided pathways model. Depending on the framework chosen by our college, our non-majors as well as some of our core courses may be impacted in ways that are not yet clear.

2.6 Provide any other data that is relevant to your self-study.

3.0 Strengths, Weaknesses, Opportunities, Challenges (SWOC)

Based on your analysis in 2.1 through 2.6, answer the following questions:

3.1 What are the strengths of your program?

1. An increase in the number of full-time faculty. This has allowed us to increase the number of students we serve, and increase faculty outreach as well as increase the number of students in undergraduate research locally and nationally. The Department has been actively engaged in updating and modernizing our laboratory equipment and experiments. The Department has been creative to address the facilities shortfall including offering Saturday labs.

2. A mentoring program, Peer Undergraduate Mentoring Program (PUMP), aimed to improve student retention and successful completion in STEM courses was started in the fall of 2012 by Dr. Bridget Salzameda. PUMP pairs first year FC STEM students with academically outstanding STEM students from California State University, Fullerton. Offering individualized peer mentoring has been beneficial to the STEM students at Fullerton College. This is illustrated by the positive preliminary data (Appendix G).

3. Supplemental Instruction (SI) Program has been expanded and modified. Since last program review, SI within the Chemistry Department was modified with the focus shifting to peer (student) facilitators. Since Fall 2016, there have been a total of 25 chemistry sections offering SI and students who participate in SI have higher success and retention rates (Appendix H).

3.2. What are the weaknesses of your program?

1. The weaknesses of the chemistry program results from the number of adjunct faculty that are currently teaching for the Chemistry Department, the availability of lecture and laboratory rooms, the aging computers currently used in the computer laboratories as well as the continued and significant unmet demand for chemistry courses:

2. The strength of the Chemistry Department can be found in the full-time faculty. The knowledge and experience of the full-time faculty within the Department cannot be replaced by adjunct faculty. Therefore, the increase in the number of sections taught by adjunct faculty presents a significant weakness, particularly since our adjunct pool contains a significant number of inexperienced instructors. This weakness mostly affects students in our Preparation for General Chemistry (CHEM 107 F) courses as a large percentage of these courses are taught by adjunct faculty. For the upcoming spring 2018 semester, 11 out of 15 sections of CHEM 107 F course offerings (73%) will be taught by adjunct faculty. This is despite the additional net increase of four full-time faculty members over the last three years in the chemistry Department. Hence, the addition of full-time faculty to the Department has barely kept up with the increase in demand for courses in the chemistry curriculum. A strategic action plan will be proposed in this program review to begin biweekly professional development seminars with the specific goal of obtaining more training for adjunct faculty teaching both CHEM 107 F and CHEM 111AF courses to improve student success in those courses.

3. Another weakness continues to be the lack of facilities space. There is much demand for chemistry courses, but we are limited in the number of students the Department can serve by the amount of space available, especially in the laboratory. This limits our ability to meet the needs of our students

3.3 What opportunities exist for your program?

1. The increased interest in STEM fields means there is a high demand for Chemistry classes. This gives the Chemistry Department an opportunity to grow the number of course sections to serve more students if adequate staff, facilities and resources are provided.

2. The recent addition of six new faculty members is a great opportunity. As these faculty integrate within the department, their innovative ideas and experiences will contribute to the continuous quality improvement of our program.

3. Despite the substantial increase in the number of sections offered by the Chemistry Department, a substantial number of students appear on our waitlist each semester that cannot be accommodated. The addition of portable labs will allow us to serve more students, mitigating one of the barriers to student completion.

4. To accommodate additional students with our limited facilities we began offering weekend classes (Meeting on Friday and Saturday) during the Fall 2017 semester. The weekend classes give us an opportunity to serve a different student population that may have been previously underserved. All sections of our weekend classes filled and had students on waitlists.

3.4 What challenges exist for your program?

1. One major challenge that exists for the Chemistry Department is the lack of facilities to sufficiently address the demand for our courses. Through creative scheduling including utilizing early mornings, late evenings and Saturdays, we have been able to maximize the number of students that we can serve. Nonetheless, many of our courses have waitlists that are full or nearly full. We would like to continue to decrease the time to completion for the students we serve, however it is unclear how we can do that without additional facilities.

2. Staffing is another major problem. Finding qualified chemistry adjunct faculty is a problem not only at Fullerton College, but throughout the region. When adjunct faculty are hired and trained, they do not remain with the Department for a significant period of time. In the Spring 2015 semester we had 19 adjunct faculty. Hiring additional full-time faculty temporarily reduced that number, but we continue to increase the number of sections. As a result, we will have 17 adjunct faculty for the Spring 2018, yet only 4 of those remain from 2015. This large turnover means that we are constantly hiring and training new faculty. Furthermore, the large dependence on a tenuous pool of adjunct faculty imperils the increase in sections that we have been offering. In each of the last four semesters, despite being fully staffed early in the process, we have had to resort to emergency staffing measures to avoid cancelling full sections that had full waitlists. This included last-minute hiring of adjunct faculty with little or no teaching experience, and obtaining special permission to have one or more adjunct faculty exceed the part-time load each semester. This is not sustainable and more full-time faculty are needed.

4.0 Student Learning Outcomes (SLO) Assessment

4.1 List your program level SLOs and complete the expandable table below.

	Program Student Learning Outcomes (PSLOs)	Date Assessment Completed	Date(s) Data Analyzed	Date(s) Data Used For Improvement	Number of Cycles Completed
1.	Demonstrate knowledge of inorganic and organic chemistry and have the ability to articulate this chemical knowledge in verbal, written, and/or computational form	Spring 2015, Fall 2015, Spring 2016	Fall 2017	Fall 2017	3
2.	Demonstrate the ability to conduct experiments, analyze data, and interpret results, while observing responsible and ethical scientific conduct.	Spring 2015, Fall 2015, Spring 2016	Fall 2017	Fall 2017	3
3.	Demonstrate the use of proper procedures and regulations for safe handling and use of chemicals.	Spring 2015, Fall 2015, Spring 2016	Fall 2017	Fall 2017	3

4.2 Assessment: Complete the expandable table below.

Program Student Learning Outcomes **Assessment for Instructional Programs at Fullerton College**			
Intended Outcomes	**Means of Assessment & Criteria for Success**	**Summary of Data Collected**	**Use of Results**
1. Students will demonstrate knowledge of inorganic and organic chemistry and have the ability to articulate this chemical knowledge in verbal, written, and/or computational form	Assessed at the course level and mapped to the PSLO. Common exam questions are used for each course. A passing score on those questions is considered success	The composite of the 3 assessments (Spring 2015-Spring 2016) showed 74 % of students met or exceeded expectations.	We will have a change to our general chemistry textbook to make it more readable for students.
2. Students will demonstrate the ability to conduct experiments, analyze data, and interpret results, while observing responsible and ethical scientific conduct.	Assessed at the course level and mapped to the PSLO. Includes some common exam questions and, laboratory reports for each course. A passing score on exam questions data analysis in lab reports is considered success	The composite of the 3 assessments (Spring 2015-Spring 2016) showed 98.5% of students met or exceeded expectation.	The way the data was reported in eLumen seemed inconsistent with what was observed in the individual courses. We will have further discussions as to how be consistent with how our courses are mapped to this PSLO

3. Students will demonstrate the use of proper procedures and regulations for safe handling and use of chemicals. .	Assessed at the course level and mapped to the PSLO. Lab practical exams are evaluated along with instructor analysis of specific experiments for each course. Proficiency in a majority of the procedures appropriate for each course is considered successful	The composite of the 3 assessments (Spring 2015-Spring 2016) showed 97 % of students met or exceeded expectations	The way the data was reported in eLumen seemed inconsistent with what was observed in the individual courses. We will have further discussions as to how be consistent across or courses mapped to this PSLO

4.3 What percentage of your program level SLOs have ongoing assessment? Comment on progress/lack of progress.

Since course SLOs are mapped to PSLOs, 100% of our program level SLOs have ongoing assessment.

4.4 How has assessment of program level SLOs led to improvements in student learning and achievement?

Assessment of our program level SLOs have led to discussions about our expectations of outcomes at the course level and the progression of skills we expect as the students move through our program. The course level data has led to changes in our laboratory program for general chemistry and an improvement is student competencies. Important changes include updating to more digital equipment and increasing the scope and depth of student laboratory notebook requirements.

4.4 How has assessment of program-level SLOs led to improvements in transfer or certificate/degree awards?

This has been difficulty to assess, since improvements in transfer are affected by many variables including the availability of courses. As the number of sections have increased, we have seen the number of transfers and degrees increase.

4.5 What challenges remain to make your program level SLOAs more effective?

When reviewing data from eLumen software, we recognized that the way course SLOAs have been entered into the program made viewing overall program SLOs more difficult. The reports that are generated from eLumen do not correlate well with the data requested in Program Review. It would be useful if reports could be imported into the Program Review template facilitating the connection between SLOs and Program Review. Until that can be accomplished, we will need to work together as a Department to modify how data is entered by faculty to maximize the utility of the data. This will enable better evaluation of trends and significance of individual PSLOs.

5.0 Evaluation of Progress Toward Previous Goals/SAP's (Future program review templates for this section will identify "previous goals" as "previous *strategic action plans*"-- SAP's.)

5.1 List the goals from your last self-study/program review.

1. Create a Campus STEM Resource Center
2. Facilities and faculty for the continued growth of the Chemistry Department
3. Support for the Chemistry Department laboratories and Chemical Stockroom
4. Support to improve student success through a Peer Undergraduate Mentoring Program (PUMP)
5. Support to improve student success in the program: Science Boot-Camps
6. Expansion of Supplemental Instruction sessions for chemistry courses

5.2 Describe the level of success and/or progress achieved in the goals listed above.

1. While a Campus STEM Resource Center has not been created, the campus has hired a STEM counselor that has helped the Department to achieve some of the expected outcomes for this goal including:
   - Increased number of STEM degrees/certificates
   - Increased number of STEM majors transferring
   - Increased number of students attending tutoring and SI sessions and boot camps
   - Increased placement of students in research and internship programs

2. Although the number of fulltime faculty increased, there was not a concomitant increase in facilities. The Department was able to achieve some of the expected outcomes including:
   - Increased the number of chemistry courses sections from 65 (in 2014) to 90 (in 2017).
   - Increased student enrollment in chemistry courses from 1587 (in 2014) to 2127 (in 2017).
   - Increased number of Associate degrees in Chemistry
   - Increased number of students attending tutoring and SI sessions as the number of SI sections increased to 15 for the 2016-17 year. This contributed to overall student success (Appendix H)
3. Support for the Chemistry Department laboratories and Chemical Stockroom helped the Department achieve some of the expected outcomes including:
   - Increased number of students served in laboratory classes. As the number of course sections increased from 65 to 90, the number of students served in laboratory classes increased in kind. This required additional funding for chemicals and waste disposal, additional equipment to increase the number of student lockers, additional hourly help including help to realign laboratory rooms and equipment to increase capacity. Additional funding was also used to update and modernize laboratory equipment
   - Increased number of Associate of Arts in Chemistry degrees
   - Increased participation in community events such as KinderCarminata, and National Chemistry Week celebrations. This required additional supplies and equipment used for outreach.
4. Support to improve student success through a Peer Undergraduate Mentoring Program (PUMP) has allowed the Department to achieve the anticipated outcomes including:
   - Increased retention rate of PUMP students in chemistry program

- Increased success rate of PUMP students in chemistry program
- Increased persistence of students in chemistry program

5. Support for Science Boot Camps to improve student success has resulted in the Department achieving the following outcomes:
   - Increased retention rate of students in chemistry program
   - Increased success rate of students in chemistry program. Students who participated in the program achieved higher levels of success compared to comparable students who did not attend (Appendix I). The courses and number of students served in boot camps were expanded to include students in the STEM cohorts. Courses now offering boot camps include CHEM 107 F, CHEM 111AF, CHEM 111BF, CHEM 201 F and a newly planned CHEM 211AF.
   - Increased persistence of students in chemistry program. As students achieve more success, they are more likely to persist in the program
6. Expansion of Supplemental Instruction (SI) has resulted in the Department achieving the following outcomes:

   Data for the 2016-2017 academic term show students that attended 5 or more SI sessions per semester had a 90.0% completion rate compared to those that did not participate (81.6%) and students in equivalent courses with no SI offered (83.8%). Students that attended 5 or more SI sessions per semester had a 77.3% success rate compared to those that did not participate (69.4%) and students in equivalent courses with no SI offered (71.1%).

5.3 How did you measure the level of success and/or progress achieved in the goals listed above?

1. It is difficult to assess the impact of the STEM Counselor directly. We have, however, seen an increase in coordination between STEM areas as is evidenced by the increased STEM cohorts.
2. The impact of increasing the fulltime faculty can be seen in Section 2.1 that shows the increase in enrollment, numbers of sections offered, and in Section 2.2 that shows the increase in degrees, and transfers.
3. The data in section 2.2 show an increase in the number of students served, the number of transfers and the number of degrees awarded.

4. For the PUMP program, the following has been summarized from data collected for the Spring 2017 semester (last updated 3/26/2017).
   a) A comparison, between two general chemistry cohorts (CHEM 111AF), in which one cohort participated in PUMP and the other did not, was made. This comparison revealed that students who participated in PUMP, scored between 7 and 21% higher on chemistry quiz and exams, compared to students who did not participate in PUMP (Appendix G, Figure 1). A similar comparison showed a 14% increase in course retention in favor of PUMP students (Appendix G, Figure 2,).
   b) Only 62% of students in the non-PUMP cohort had a grade of C or better, whereas, 87% of the PUMP cohort students had a grade of C or better (Appendix G, Figure 3).
   c) Only 4% of PUMP students were failing CHEM 111AF, however, over 20% of non-PUMP FC students were failing CHEM 111AF at the time of this assessment (Appendix G, Figure 4)

d) These data suggest PUMP is greatly benefiting Fullerton College STEM students in a several areas of student success from the interaction with CSUF student mentors (Goal 3, Objective 3.2)

5. The Department has seen success from the Boot Camps. Throughout the last 3 years, the Chemistry Department has offered Boot Camps for students enrolled in CHEM 107 F, 111AF, 111BF, and 201 F. The Boot Camps have been funded partly by external grants, student equity funding, and the last program review funding cycle. These Boot Camps have been successful in preparing students for the course for which they have enrolled. Written surveys are always positive, and data from Spring 2016 breakdown demographics of students enrolled in Boot Camps and how their success and retention rates compare to those not attending Boot Camps (see Appendix I). As one example, during Spring 2016 in the CHEM 111BF Boot Camp, 50% of students were Hispanic, and 91% of Boot Camp attendees of all ethnicities succeeded in the course compared to the 72% course success rates for non-Boot Camp students. Surveys from CHEM 111B boot camp attendees are sent out during the 10^{th}-12^{th} week of the semester. Students surveyed during this time admit that the boot camps have been helpful to their success in the course.

6. For Supplemental Instruction (SI) a comparison of active participants in an SI section compared to equivalent non-SI sections showed a significant improvement in retention (90% vs. 83.8% non-SI) and success (77.3% vs 71.1 non-SI) in the 2016-2017 academic term. For the classes where SI was offered, 73% of all students attended at least one SI session (see Appendix H)

5.4 Provide examples of how the goals in the last cycle contributed to the continuous quality improvement of your program.

1. The increase in full-time faculty has resulted not only in increased number of sections offered and more access to high-demand chemistry classes for students, but has also seen more faculty involvement in community outreach, committee service and innovative teaching approaches.

2. The support for the Chemistry Department laboratories has led to a modernization of some laboratory experiments and introduction of innovative experiments.

3. The Peer Undergraduate Mentoring Program (PUMP) has demonstrated improved success and retention rates

5.5 In cases where resources were allocated toward goals in the last cycle, how did the resources contribute to the improvement of the program?

1. The addition of new faculty has allowed the Chemistry Department the flexibility to offer more sections, reducing the wait for students seeking chemistry classes and mitigating one of the barriers to completion.

2. The support for the Chemistry Department laboratories was essential, as the 50 percent increase in sections had a concomitant increase in supplies, equipment and waste disposal. The additional Chemical Stockroom personnel was crucial to our weekend course offerings. Without that support, no Saturday labs could be offered.

3. The Peer Undergraduate Mentoring Program (PUMP) has had a remarkable impact on the students involved in the program (Section 5.3 above). Run as a small pilot, PUMP students have shown significantly higher rates of success and retention compared to a similar group of non-PUMP students (Appendix G).

4. Science Boot Camps have had an impact on those students participating (see Section 5.3 above). Student not only felt positive about their Boot Camp experience, they performed better than their non-Boot Camp peers (Appendix I)

5. For course sections offering Supplemental Instruction (SI), students had significantly higher success and retention rates compared to non SI sections (Section 5.3 above). We are seeking to offer more SI sections to capitalize on this success (Appendix H).

5.6 If funds were not allocated in the last review cycle, how did it impact your program?

No funds were allocated for increasing the number of laboratory rooms. As a result, despite very strong demand, we are limited in the number of students we can accommodate and in our ability to significantly reduce the time for students to get degrees or transfer.

6.0 Strategic Action Plans (SAP) [formerly called Goals (6) and Requests for Resources (7)]

Using the tables below, list the strategic action plans (SAPs) for your program. These plans should follow logically from the information provided in the self-study. Use a separate table for each SAP.

SAPs for this three-year cycle:

STRATEGIC ACTION PLAN # 1	
Describe Strategic Action Plan: (formerly called short-term goal)	Support to improve student success through biweekly professional development seminars for chemistry adjunct faculty teaching pre-general chemistry (CHEM 107) and general chemistry (111A) courses, as discussed in Section 3.2.
List College goal/objective the plan meets:	College Goals: Goal #1: Fullerton College will promote student success. Goal #2: Fullerton College will reduce the achievement gap. Objectives: 1.1: Address the needs of under-prepared students. 1.2: Increase course retention and success. 1.3: Increase the number of degrees and certificates awarded. 1.4: Increase the number of transfers. 1.5: Increasing the number of students participating in STEM activities. 1.6: Increase the persistence rate of students. 2.2: Increase the retention rate of Hispanic and African-American students by at least 2%. 2.3: Increase the success rate of Hispanic and African-American students by at least 2%. 2.4: Increase the persistence rate of Hispanic and African-American students by at least 2%. 2.5: Increase the number of students from underrepresented groups participating in STEM activities.
Describe the SAP: (Include persons responsible and timeframe.)	Starting the week prior to the start of each semester, all adjunct faculty members who are teaching a CHEM 107 course will be invited to participate in a (paid) teaching workshop for one hour on a biweekly basis. Topics to be considered will include: – Building classroom community. – Syllabus design. – Lab safety. – Building a database of lecture notes, worksheets, exams, quizzes, etc. for a CHEM 107 and/or CHEM 111A course. – Pedagogies related to course content. – Chemistry demonstrations for student engagement. – Writing appropriate-level exams. – Sharing information about programs or events related to student success, retention and persistence.

	A total of 8 meeting hours for each participating member will be required for an entire semester (16 hours per academic year). To encourage part-time faculty to participate, we anticipate an hourly rate of $55 per hour will be required. The current number of part-time faculty teaching either CHEM 107 F or CHEM 111AF is ~13. If (10) of those faculty participate plus 1 full-time faculty coordinates the meetings, then the yearly expenditure for this SAP would be: – One full-time faculty coordinator: 32 hours (@ $55 / hour) = $1,760 – 10 part-time faculty participating: 160 hours (@ $55 / hour) = $8,800 $10,560 / yr. ***The main benefit to this SAP is that if we are unable to hire additional full-time faculty soon, then we can at least improve the level of instruction for these courses by improving the teaching capabilities of new and returning adjunct faculty currently teaching for the Department. Given the high level of turnover among adjunct faculty in these courses, it may be necessary to conduct these workshops on a continuing basis. Another benefit is that such a program may help the Department attract and retain more high quality adjunct faculty
What *Measurable Outcome* is anticipated for this SAP?	– Increased number of students in chemistry program transferring – Increased retention rate of students in chemistry program – Increased success rate of students in chemistry program – Increased persistence of students in chemistry program
What specific aspects of this SAP can be accomplished without additional financial resources?	These faculty workshops would be solely dependent on external funding. This program is not currently supported with financial resources.

If additional financial resources would be required to accomplish this SAP, please complete the section below. Keep in mind that requests for resources must follow logically from the information provided in this self-study.

Type of Resource	Requested Dollar Amount	Potential Funding Source
Personnel	$10,560	General Funds
Facilities		
Equipment		
Supplies		
Computer Hardware		
Computer Software		
Training		
Other		
Total Requested Amount	$10,560 per year	($31,680 for three years)

STRATEGIC ACTION PLAN # 2	
Describe Strategic Action Plan: (formerly called short-term goal)	Support for the Chemistry Department to participate in community outreach activities to promote both our program and Fullerton College.
List College goal/objective the plan meets:	College Goal #: Goal #1: Fullerton College will increase student success. Goal #2: Fullerton College will reduce the achievement gap. Goal #3: Fullerton College will strengthen connections within the community. Objective #: 1.5: Increase the number of students participating in STEM activities. 2.5: Increase the number of students from underrepresented groups participating in STEM activities. 3.2: Strengthen partnerships with local feeder high schools and universities. 3.3: Strengthen partnerships with local business and industry. 3.5: Increase engagement of the college with the community through college events, community service, and other partnerships.
Describe the SAP: (Include persons responsible and timeframe.)	The Chemistry Department is committed to engaging in outreach activities, specifically, we aim to reach K-12 students by providing them with fun and interactive activities to get them enthusiastic about chemistry, which hopefully serves as a strong foundation for their future success as chemistry undergraduates here at FC. It is important to expose individuals at an early age to scientific concepts so that when these students get to college they are already excited about pursuing STEM-related disciplines. Our faculty and staff currently participate in numerous outreach events, both on- and off-campus such as our yearly STEM Open House, National Chemistry Week, KinderCaminata, and Family & High-School Senior Night, among others. In addition, we rely on enrolled FC student volunteers to provide them with opportunities to serve as mentors and leaders to younger K-12 students. Moreover, our Chemistry 100 F apple-course provides non-major students with an opportunity to visit local K-12 schools and perform demonstrations in the classroom.
What *Measurable Outcome* is anticipated for this SAP?	– Increased number of traditionally underrepresented students interested in majoring in chemistry – Increased participation of local K-12 schools in outreach events – Promoting our program and Fullerton College to our local community – Provide FC students with opportunities to reach out to their local community

What specific aspects of this SAP can be accomplished without additional financial resources?	Most of our outreach participation relies on faculty, staff and student volunteers. However, for the Chemistry Department to continue to participate in the aforementioned events, we need funding to acquire the equipment and supplies for our demonstrations. <u>Equipment ($2500)</u>: Solid phase extraction cartridges for food dye separation hands-on activities – C18-E stationary phase, 2 g sorbent mass: 2 boxes (@ $200/box) = $400 – Phenyl stationary phase, 1 g sorbent mass: 1 box (@ $200/box) = $200 – Vacuum adapter caps for 1 g cartridges: 2 packs (@ $50 / pack) = $100 – Vacuum adapter caps for 2 g cartridges: 2 packs (@ $50 / pack) = $100 – A Fluorescent Rock Set : $814 – Short-wave UV lamp: 2 lamps (@ $379 / lamp) = $758 – UV-protective glasses: 16 pairs ($8 / pair) = $128 <u>Supplies ($1300)</u>: – T-shirts for events: 60 t-shirts (@ $10 / t-shirt) = $600 over 3 years. – Fluorescent bracelet/necklace beads: $250 over 3 years. – Miscellaneous items TBD: $450 over 3 years <u>Computer Hardware / Software ($1200)</u>: – Laptop for hands-on graphing activities: 2 (@ $1350 ea.) = $2700 – graphing package: 2 (@ $100 ea.) = $200

If additional financial resources would be required to accomplish this SAP, please complete the section below. Keep in mind that requests for resources must follow logically from the information provided in this self-study.

Type of Resource	Requested Dollar Amount	Potential Funding Source
Personnel		
Facilities		
Equipment	$2,500	
Supplies	$1,300	
Computer Hardware	$2700	
Computer Software	$200	
Training		
Other		
Total Requested Amount	$6,700	

STRATEGIC ACTION PLAN #3	
Describe Strategic Action Plan: (formerly called short-term goal)	Continue and expand offering Supplemental Instruction (SI) for chemistry courses.
List College goal/objective the plan meets:	College Goals: Goal #1: Fullerton College will increase student success. Goal #2: Fullerton College will reduce the achievement gap. Objectives: 1.2: Increase course retention and success. 1.3: Increase the number of degrees and certificates awarded. 1.4: Increase the number of transfers. 1.5: Increase the number of students participating in STEM activities. 1.6: Increase the persistence rate of students. 2.2: Increase the retention rate of Hispanic and African-American students by at least 2%. 2.3: Increase the success rate of Hispanic and African-American students by at least 2%. 2.4: Increase the persistence rate of Hispanic and African-American students by at least 2%. 2.5: Increase the number of students from underrepresented groups participating in STEM activities.
Describe the SAP: (Include persons responsible and timeframe.)	Since last program review, SI was institutionalized with the focus shifting to peer (student) facilitators. A full-time SI Manager, Jessica Johnson, and Faculty SI Coordinator, Brandon Floerke, oversee the program including the hiring, training, and evaluation of student SI leaders. Since Fall 2016, there have been a total of 25 chemistry sections offering SI (on average, 8.3 per semester) distributed amongst these classes: CHEM 100 F, 101 F, 107 F, 111AF, 111BF, and 201 F. Data for the 2016-2017 academic term show SI had a positive impact on students that participated (Section 5.3.6). Traditionally, all chemistry SI courses have been funded by Equity funds but funding is uncertain for the Spring 2018 term and beyond. To ensure that we are able to continue offering SI sessions to improve student retention and success, a more stable source of funding is sought. – Support for 8 student SI leaders per semester ($12/hour, 12 hours/week, 14 weeks/semester)
What *Measurable Outcome* is anticipated for this SAP?	– Pre- and post-surveys of students' perspectives on SI – Increased retention rate of students in chemistry program – Increased success rate of students in chemistry program – Increase persistence in chemistry program

What specific aspects of this SAP can be accomplished without additional financial resources?	Equity funds have traditionally been used to support chemistry SI courses and if continued, no additional support would be required.

If additional financial resources would be required to accomplish this SAP, please complete the section below. Keep in mind that requests for resources must follow logically from the information provided in this self-study.

Type of Resource	Requested Dollar Amount	Potential Funding Source
Personnel	$32,300/year	General Fund
Facilities	-	-
Equipment	-	-
Supplies	-	-
Computer Hardware	-	-
Computer Software	-	-
Training		
Other	-	-
Total Requested Amount	$32,300/year	

STRATEGIC ACTION PLAN # 4	
Describe Strategic Action Plan: (formerly called short-term goal)	Creation of Chemistry Department Webpage
List College goal/objective the plan meets:	College Goals: Goal #1: Fullerton College will increase student success. Goal 2: Fullerton College will reduce the achievement gap. Goal #3: Fullerton College will strengthen connections with the community. Objectives: 1.3: Increase the number of degrees and certificates awarded. 1.5: Increase the number of students participating in STEM activities. 2.5: Increase the number of students from underrepresented groups participating in STEM activities. 3.1: Strengthen our contacts with Alumni. 3.2: Strengthen partnerships with local feeder high schools and universities. 3.3: Strengthen partnerships with local business and industry. 3.5. Increase engagement of the college with the community through college events, community service, and other partnerships.
Describe the SAP: (Include persons responsible and timeframe.)	The Chemistry Department will produce a website for the purpose of communicating information to the (current and potential) students of Fullerton College and the community surrounding Fullerton College. The website will provide students with links to STEM activities within the Natural Sciences Division; STEM activities associated with the Science Club; scholarships, internships and research opportunities within STEM; tutoring schedules and volunteer opportunities; course materials; and advertisement of the degrees offered by the Chemistry Department (A.A. and A.S.). Aside from increasing the number of students involved in STEM-related activities, this webpage will provide students will additional resources to assist in learning. – Professional Expert Pay (100 hours @ $55/hour)
What *Measurable Outcome* is anticipated for this SAP?	– Increased number of students in chemistry program transferring – Increased number of Chemistry Associate in Arts and Associate in Science degrees – Increased participation of local businesses and industry in Department events – Increased participation in community events

What specific aspects of this SAP can be accomplished without additional financial resources?	The Department webpage will be produced as time allows. Funding in the form of professional expert pay will ensure that the creation of the webpage occurs more quickly.

If additional financial resources would be required to accomplish this SAP, please complete the section below. Keep in mind that requests for resources must follow logically from the information provided in this self-study.

Type of Resource	Requested Dollar Amount	Potential Funding Source
Personnel	$5,500	Carryover Funds
Facilities	-	-
Equipment	-	-
Supplies	-	-
Computer Hardware	-	-
Computer Software	-	-
Training	-	-
Other	-	-
Total Requested Amount	$5,500	

STRATEGIC ACTION PLAN # 5	
Describe Strategic Action Plan: (formerly called short-term goal)	Support for the Chemistry Department Laboratories and Chemical Stockroom
List College goal/objective the plan meets:	College Goals: Goal #1: Fullerton College will increase student success. Goal #2: Fullerton College will reduce the achievement gap. Goal #3: Fullerton College will strengthen connections with the community. Objectives: 1.2: Increase course retention and success. 1.3: Increase the number of degrees and certificates awarded. 1.4: Increase the number of transfers. 1.5: Increase the number of students participating in STEM activities. 1.6: Increase the persistence rate of students. 2.2: Increase the retention rate of Hispanic and African-American students by at least 2%. 2.3: Increase the success rate of Hispanic and African-American students by at least 2%. 2.4: Increase the persistence rate of Hispanic and African-American students by at least 2%. 2.5: Increase the number of students from underrepresented groups participating in STEM activities. 3.2: Strengthen partnerships with local feeder high schools and universities 3.5: Increase engagement of the college with the community through college events, community service, and other partnerships.
Describe the SAP: (Include persons responsible and timeframe.)	The Chemical Stockroom is an essential component of the Chemistry Department. The Chemical Stockroom is responsible for the procurement and preparation of chemicals for use in the chemistry laboratories, and the maintenance and purchase of equipment that are commonly used in chemistry experiments and demonstrations. Additionally, every community event in which the Chemistry Department is engaged (e.g., National Chemistry Week, Kindercaminata and Open House celebrations) requires support from the Chemical Stockroom. To ensure that the Chemical Stockroom is capable of providing the Chemistry Department with the support required for the courses that are offered and for participation in community events, the following resources are requested: <u>Course Specific Equipment:</u> – Gas Chromatograph, Mass Spectrometer Detector (1 @ $60,000) – PicoSpin-80 NMR Spectrometer (1 @ $22,000) – Bomb Calorimeter (1 @ $5248) – Buchi Rotary Evaporater (1 @ $7,200)

	– Abbe 5 Refractometer (1 @ $2,000) – Mel-Temp Capillary Melting Point Apparatus (4 @ $1,175 each) – iPads (15 @ $2,800 each) and Charging Station (1 @ $500) – PicoSpin Capillary Cartridge (1 @ $600) – Class A Burets (60 @ $177 each) – Digital Power Supplies (15 @ $50 each) <u>General Equipment / Stockroom:</u> – FlashScrubber, Glassware Washer (1 @ $13,200) – ChemDraw Software, 3-year Site License (1 @ $5,000) – Analytical Balance (1 @ $4,000) – Spec200 Spectrometers (16 @ $1700 each) – Liquid Nitrogen Dewar, XX L (1 @ $1,300) and Dispenser (1 @ $900) – Corning Heavy Duty Stirrer (2 @ $700 each) – Corning Hot Plate (10 @ $461 each) – SpectroVisPlus Spectrometer Probes (15 @ $450) – Vernier LabQuest2 (15 @ $370 each) <u>Demonstration Equipment:</u> – FLIR Systems Scout III 240 Thermal Night Vision Monocular (1 @ $1,500) – Vacuum Pump (1 @ $1000) – Cloud Chamber, CloudTracker2, (1 @ $400)
What *Measurable Outcome* is anticipated for this SAP?	– Purchased items (from list above, “Description of SAP”) – Increased number of students in chemistry program transferring – Increased retention rate of students in chemistry program – Increased success rate of students in chemistry program – Increased persistence of students in chemistry program – Increased number of Chemistry Associate in Arts and Associate in Science degrees – Increased participation in community events
What specific aspects of this SAP can be accomplished without additional financial resources?	The following items can be purchased with Lottery monies: Corning Hot Plates, Class A Burets, LabQuest2s, SpectroVisPlus Spectrometer Probes, Digital Power Supplies, and Cloud Chamber. All other items must either be purchased with Program Review or Instructional Equipment funding.

If additional financial resources would be required to accomplish this SAP, please complete the section below. Keep in mind that requests for resources must follow logically from the information provided in this self-study.

Type of Resource	Requested Dollar Amount	Potential Funding Source
Personnel	-	-
Facilities	-	-
Equipment	$ 186,928	General Fund/Instructional Equipment
Supplies	-	-
Computer Hardware	$42,000	General Fund
Computer Software	$5000	General Fund
Training	-	-
Other	-	-
Total Requested Amount	$228,680	

STRATEGIC ACTION PLAN # 6	
Describe Strategic Action Plan: (formerly called short-term goal)	Support to improve student success through a Peer Undergraduate Mentoring Program (PUMP), as discussed in Section 3.1.
List College goal/objective the plan meets:	College Goal #: Goal #1: Fullerton College will promote student success. Goal #3: Fullerton College will strengthen connections within the community. Objective #: 1.2: Increase course retention and success. 1.3: Increase the number of degrees and certificates awarded. 1.4. Increase the number of transfers to 4-year institutions 1.5: Increase the persistence rate of students. 1.6 Strengthen partnerships with local feeder high schools and universities.
Describe the SAP: (Include persons responsible and timeframe.)	The intent of the Peer Undergraduate Mentoring Program (PUMP) is to improve the study strategies of first- year college students through a student/peer-mentoring program. Through PUMP, selected students of Fullerton College (FC) are given tools to: – Improve retention rates in STEM courses – Improve completion rates in STEM courses – Improve degrees in STEM majors – Improve transfer rates into four-year universities in STEM majors. – Improve student success in STEM post-graduate school and/or STEM careers. The essential elements of the PUMP program include: – Selection of FC STEM students – Selection of California State University, Fullerton (CSUF) STEM mentors – Mentor training workshop – Mentor/Student introduction luncheon – Advisor/Mentor/Student Meetings – Initial and Final Assessment Surveys Individuals in the PUMP program will have well-defined roles: – FC Faculty Advisor: will provide a training workshop for mentors; is responsible for the initial preparation to start-up the program; will meet weekly with FC students; will meet

	weekly with mentors; and is responsible for preparation, administration, and program assessment – CSUF Faculty Advisor: will select and invite outstanding CSUF undergraduate STEM students to participate; will meet weekly with mentors; and will collaborate with FC Faculty Advisor regarding meeting preparation and program progress – CSUF Mentors: will meet every two weeks with FC students; will interact weekly with FC and CSUF Faculty Advisors; and preparation – FC Students: will meet every two weeks with mentor. As an estimate of the resource request, one semester of PUMP will require the following effort/time: – FC Faculty Advisor: 32 hours plus 10 additional hours for assessment, 42 hours total ($55/hour) – CSUF Faculty Advisor: 32 hours ($55/hour) – CSUF Mentor: 75 hours (for each of the approximately 10 mentors, $15/hour)
What *Measurable Outcome* is anticipated for this SAP?	Pre- and post-surveys of student's perspective on program and collection of class assessment and data provided by the college will help measure outcomes for this SAP. Specifically, the following outcomes are anticipated: 1. Increased number of STEM students transferring to 4-year universities 2. Increased retention rate of students in STEM courses 3. Increased success rate of students in STEM courses 4. Increased student performance in STEM courses
What specific aspects of this SAP can be accomplished without additional financial resources?	The PUMP program is incredibly dependent on external funding. With exception to funding for the CSUF Mentors, the PUMP program is not currently supported with institutionalized financial resources.

If additional financial resources would be required to accomplish this SAP, please complete the section below. Keep in mind that requests for resources must follow logically from the information provided in this self-study.

Type of Resource	Requested Dollar Amount	Potential Funding Source
Personnel	$15,870 per year	General Fund/Project RAISE
Facilities		
Equipment		
Supplies	$2500 per year	Carryover funds
Computer Hardware		
Computer Software		
Training		
Other (Hospitality)	$2000 per year	
Total Requested Amount	$19,820 per year	$ 59,460 for three years

STRATEGIC ACTION PLAN # 7	
Describe Strategic Action Plan: (formerly called short-term goal)	Expanded facilities along with more full-time faculty and stockroom staff to support sustained expansion of Chemistry sections and reduce the time to completion for students
List College goal/objective the plan meets:	College Goals: Goal #1: Fullerton College will promote student success. Goal #2: Fullerton College will reduce the achievement gap. Objectives: 1.1: Address the needs of under-prepared students. 1.2: Increase course retention and success. 1.3: Increase the number of degrees and certificates awarded. 1.4. Increase the number of transfers. 1.5: Increase the number of students participating in STEM activities 1.6: Increase the persistence rate of students. 2.2: Increase the retention rate of Hispanic and African-American students by at least 2%. 2.3: Increase the success rate of Hispanic and African-American students by at least 2%. 2.4: Increase the persistence rate of Hispanic and African American students by at least 2% 2.5: Increase the number of students from underrepresented groups participating in STEM activities
Describe the SAP: (Include persons responsible and timeframe.)	To address the increasing demand for chemistry courses, the Department has increased the number of sections offered significantly through creative use of facilities including realigning the laboratory space and offering classes from early in the morning to late in the evening and six days per week. The continued increase in demand for chemistry courses can only be met through an increase in the number of available lecture and laboratory rooms. The lecture and laboratory courses are currently offered in multiple rooms in the 400 Building (412, 414AB, 416A, 416B, 417, 420, 421, 423, 425, 432, 433, 434, 435, 436, 439, 441). In addition to retaining access to these rooms, the Chemistry Department requests the use of an established lecture room (or “portable”) and funding for the installation of a portable laboratory in Staff Parking Lot B-2 East. Access to a single lecture room and single laboratory would allow the Chemistry Department to efficiently use existing lecture and laboratory space and serve many more students. An increase in the number of laboratory rooms coupled with an increase of lab sections offered will require additional staffing for the

	chemistry stockroom, including the addition of a 25% Lab Clerk and additional hourly help. The Chemistry Department also requests additional fulltime faculty. As discussed in Section 3.4, the pool of qualified adjunct faculty in the region is sufficiently small that trying to maintain our current number of course sections with 17 adjunct faculty is not feasible. In each of the last four semesters, despite being fully staffed early in the process, we have had to resort to emergency staffing measures to avoid cancelling full sections that had full waitlists included last-minute hiring of adjuncts with little or no teaching experience and obtaining special permission to have one or more adjunct faculty exceed the part time load each semester. This is not sustainable. To reliably staff our program with the current number of sections offered, we would need to have a minimum of 16 full-time faculty along with a team of 12-14 adjunct faculty. The Chemistry Department request that we begin the process of increasing the number of fulltime faculty during the next 3 years of the program review cycle. 25% Lab Clerk = $11,832 3 Fulltime Faculty 3 x $79,859 = 239,577
What *Measurable Outcome* is anticipated for this SAP?	The Chemistry Department will be able to sustain or grow the number of sections offered and reduce the number of student on our waitlist by at least 50%.
What specific aspects of this SAP can be accomplished without additional financial resources?	Additional Resources would be required to accomplish all aspects of this SAP

If additional financial resources would be required to accomplish this SAP, please complete the section below. Keep in mind that requests for resources must follow logically from the information provided in this self-study.

Type of Resource	Requested Dollar Amount	Potential Funding Source
Personnel	$251,409	District
Facilities	500,000	Existing Bond Funds
Equipment		
Supplies		
Computer Hardware		
Computer Software		
Training		
Other		
Total Requested Amount	$751,409	

STRATEGIC ACTION PLAN 8	
Describe Strategic Action Plan: (formerly called short-term goal)	Continue and Expand offering Boot Camps for students enrolled in most chemistry courses
List College goal/objective the plan meets:	College Goals: Goal #1: Fullerton College will promote student success. Goal #2: Fullerton College will reduce the achievement gap. Objectives: 1.1: Address the needs of under-prepared students. 1.2: Increase course retention and success. 1.3: Increase the number of degrees and certificates awarded. 1.4. Increase the number of transfers. 1.5: Increase the number of students participating in STEM activities 1.6 Increase the persistence rate of students. 2.2: Increase the retention rate of Hispanic and African-American students by at least 2%. 2.3: Increase the success rate of Hispanic and African-American students by at least 2%. 2.4: Increase the persistence rate of Hispanic and African-American students by at least 2%. 2.5: Increase the number of students from underrepresented groups participating in STEM activities
Describe the SAP: (Include persons responsible and timeframe.)	Prior to the start of the semester, students are invited to attend a free intensive review session for CHEM 107 F, 111AF, 111BF, 201 F, and 211AF courses. Topics covered in these sessions include entry level skills and laboratory techniques essential to success in the course. Each boot camp lasts several days, between 6-12 total hours. Faculty are paid to provide instruction and individualized help with computations and lab skills. The total number of hours requested per semester is between 45-55 hours of instruction, with 10-15 hours of preparation/set up. Faculty are paid as professional experts at a rate of $55/hour. Total estimated cost per the next 3 years = between $18,500-$23,100.
What *Measurable Outcome* is anticipated for this SAP?	Pre- and post-surveys of student's perspective on the program Increased retention rate of students in the chemistry program Increased success rate of students in the chemistry program Increased persistence though the course sequence Increased number of students transferring

What specific aspects of this SAP can be accomplished without additional financial resources?	The boot camps are now funded by prior program review funding and by external grants such as project RAISE.

If additional financial resources would be required to accomplish this SAP, please complete the section below. Keep in mind that requests for resources must follow logically from the information provided in this self-study.

Type of Resource	Requested Dollar Amount	Potential Funding Source
Personnel	$7700/year	Project RAISE
Facilities		
Equipment		
Supplies		
Computer Hardware		
Computer Software		
Training		
Other		
Total Requested Amount	$7700/year = $23,100 for 3 years	

STRATEGIC ACTION PLAN 9	
Describe Strategic Action Plan: (formerly called short-term goal)	Support to improve student success and retention through providing classroom instructional resources that allow students access to materials.
List College goal/objective the plan meets:	College Goals: Goal #1: Fullerton College will promote student success. Goal #2: Fullerton College will reduce the achievement gap. Objectives: 1.1: Address the needs of under-prepared students. 1.2: Increase course retention and success. 1.3: Increase the number of degrees and certificates awarded. 1.4: Increase the number of transfers. 1.5: Increase the persistence rate of students. 2.2: Increase the retention rate of Hispanic and African-American students by at least 2%. 2.3: Increase the success rate of Hispanic and African-American students by at least 2%. 2.4: Increase the persistence rate of Hispanic and African-American students by at least 2%. 2.5: Increase the number of students from underrepresented groups participating in STEM activities.
Describe the SAP: (Include persons responsible and timeframe.)	To provide classroom sets of resources such as: – Tablets (such as iPads) including chargers – A charging station – Spartan software license – Clicker response systems Itemized: – Spartan license: $1200/station with a requirement of 25 stations = $30,000 – Clicker response system (for example, iClicker 2 Student Remote)= 25 remotes @ $52.99 each = $1325 – Tablets (such as iPad) = 25 tablets @ $329 each = $8,225 – A 32-device charging cart for Chromebooks, Laptops and iPad tablets at $579.00 $40,129

What *Measurable Outcome* is anticipated for this SAP?	– Increased number of students in chemistry program transferring – Increased retention rate of students in chemistry program – Increased success rate of students in chemistry program – Increased persistence of students in chemistry program
What specific aspects of this SAP can be accomplished without additional financial resources?	These resources would all require external funding.

If additional financial resources would be required to accomplish this SAP, please complete the section below. Keep in mind that requests for resources must follow logically from the information provided in this self-study.

Type of Resource	Requested Dollar Amount	Potential Funding Source
Personnel	-	-
Facilities	-	-
Equipment	$10,129 ($30,387 for 3 classroom sets)	Instructional Equipment or Project RAISE
Supplies	-	-
Computer Hardware	-	-
Computer Software	$30,000	Instructional Equipment or Project RAISE
Training	-	-
Other	-	-
Total Requested Amount	$40,129	($60,387 for multiple class sets of equipment)

STRATEGIC ACTION PLAN 10	
Describe Strategic Action Plan: (formerly called short-term goal)	Create a Campus STEM Resource Center.
List College goal/objective the plan meets:	College Goals: Goal #1: Fullerton College will promote student success. Goal #3: Fullerton College will strengthen connections with the community. Objectives: 1.1: Address the needs of under-prepared students. 1.2: Increase course retention and success. 1.3: Increase the number of degrees and certificates awarded. 1.4. Increase the number of transfers. 1.5: Increase the number of students participating in STEM activities. 1.6: Increase the persistence rate of students. 3.1: Strengthen our contacts with Alumni. 3.2: Strengthen partnerships with local feeder high schools and universities. 3.3: Strengthen partnerships with local business and industry. 3.4: Increase funding capabilities of the college. 3.5. Increase engagement of the college with the community through college events, community service, and other partnerships.
Describe the SAP: (Include persons responsible and timeframe.)	The proposed Campus STEM Resource Center will need a suitable facility to house it. There are several possible locations for the Center, which include the land adjacent to the native plant garden and the former Math Lab in the 600 building. Additionally, the STEM Center will require the services of a full-time dedicated counselor and a full-time classified staff member to run the Center. The Center's staff would have the following duties: – Identify STEM majors and develop database for tracking – Develop contact folder and meet with STEM majors once a semester – Identify potential majors and recruit them – Counsel STEM majors – Assist STEM majors with educational plan, resume, and statement of purpose – Coordinate with Institutional Research and Basic Skills offices to identify trends and opportunities – Match STEM majors with faculty mentors for increasing connectivity to college – Identify scholarship, internship, and employment opportunities in STEM fields – Develop "environmental scan" (job market) in LA/OC

	– Identify, promote, and assist undergraduate research opportunities – Assist STEM majors with applications for scholarships and internships – Update STEM calendar of events – Develop/Maintain/Update STEM website – Manage STEM tutors hiring/scheduling – Assist with tutoring and supplemental instruction – Develop and assist with STEM-experience activities – Act as liaison between STEM programs – Act as liaison with CSU/UC STEM departments – Coordinate STEM seminar series – Develop funding opportunities for STEM – Communicate/market STEM programs to campus and community
What *Measurable Outcome* is anticipated for this SAP?	– Increased number of STEM degrees/certificates – Increased number of STEM majors transferring – Increased recruitment of underrepresented groups to STEM majors – Increased success rate of STEM students – Increased persistence and retention of STEM students – Increased number of students attending tutoring and SI sessions – Creation of a STEM Alumni Network – Increased placement of students in research and internship programs – Increased opportunities for students to participate in community service – Increase the amount of grant money to support student/faculty research opportunities – Greater connectivity and partnerships with area STEM industries – More interdisciplinary coordination among STEM departments
What specific aspects of this SAP can be accomplished without additional financial resources?	This plan is highly dependent on funding and facilities.

If additional financial resources would be required to accomplish this SAP, please complete the section below. Keep in mind that requests for resources must follow logically from the information provided in this self-study.

Type of Resource	Requested Dollar Amount	Potential Funding Source
Personnel	$200,000/yr. ongoing	General Fund
Facilities	$150,000	Measure J Bond or Carryover
Equipment	$10,000	Instructional Equipment
Supplies	-	-
Computer Hardware	-	-
Computer Software	-	-
Training	-	-
Other	-	-
Total Requested Amount	$360,000	

7.0 Long Term Plans

Describe the long-term plans (four-six years) for your program. Please consider future trends in your narrative. (Identifying financial resources needed for these plans is optional.)

1. **Designing cohorts for students based on clusters of career goals**. The Chemistry Department currently accepts students with intended career goals in STEM fields in "STEM Cohorts". Students in a STEM Cohort are provided with guaranteed seats in specific chemistry course sections and receive concurrent support, including tutoring and counseling. The Chemistry Department seeks to create similar cohort models for students with other career goals, such as nursing and biotechnology.

2. **Greater collaboration with K-12, California State Universities (CSUs) and the University of California campuses (UCs) in the region**. The Chemistry Department seeks to expand research collaborations with local CSUs and UCs, providing more research opportunities for our students and a streamlined pathway for transfer to a UC or CSU campus. The Chemistry Department also seeks to engage with K-12 teachers in the community, providing professional development and resources to help strengthen the chemistry programs at those schools, and providing a pathway to possible future careers in STEM.

3. The Chemistry Department will continue to engage in and, where possible, seek the institutionalization of programs and activities to improve student retention and success. There are a number of student-centered programs the faculty are involved in that require long-term funding. Many of the chemistry faculty are engaged in programs to improve student performance in the classroom and upon transfer, e.g. Science Boot Camps, SI, and PUMP. These programs are highly dependent on financial support from Fullerton College and/or grants. The survival of these programs is tenuous as new and temporary funding sources are constantly sought. These programs are essential to improving the retention and success rates for students in the program and, therefore, the Chemistry Department will continue to seek long-term funding through their institutionalization. Additionally, the Chemistry Department would like to see the return of a 400 Building Open House and, possibly, "Science Night" to improve connections to the community and increase both awareness and interest in the sciences (and chemistry).

4. With the development of a Campus STEM Resource Center, it would be appropriate for the Chemistry Department to consider the creation a capstone (research) project that may be completed by students upon graduation of an associate's degree in chemistry and before transfer to a local university, e.g. California State University, Fullerton. In partnership with the local university, students from the program could participate in a summer research project, providing a transition from the community college to the university, while in the same providing an opportunity to satisfy undergraduate research requirements.

5. With increased emphasis on pathways, the Chemistry Department seeks to strengthen its relationship with surrounding industries. A stronger relationship may create pathways to internships for our students and the potential to create a chemistry certificate program to help meet the labor needs of these industries.

6. The Chemistry Department seeks to create projects that involve students in the design of laboratory experiments. Students will be involved in designing innovative and environmentally-friendly experiments that would be incorporated into our laboratory curriculum. These projects will serve as an introduction to laboratory research, and will serve to improve the retention and success of the students involved in the design of the project and the general population of students through the improved laboratory curriculum.

8.0 Self-Study Summary

This section provides the reader with an overview of the highlights, themes, and key elements of this self-study. It should not include new information that is not mentioned in other sections of this document.

The Chemistry Department currently consists of thirteen full-time faculty, two laboratory technicians (one at 100% and the other at 25%), a laboratory clerk and a pool of adjunct faculty (seventeen needed for Spring 2018). Since the previous Program Review (2014), the Chemistry Department has seen a significant growth in the number of sections offered; a 50% growth over the last five years. When examined in terms of full-time equivalent students (FTES), the growth is 54% over five years with continued growth anticipated for the 2017-18 academic year. This growth continues despite a campus- and District-wide decline in the FTES. The average retention and success rates for the last five years are 83 $\pm$ 4% and 73 $\pm$ 2%, respectively, and are within the ranges for the peer institutions selected. Of the peer institutions selected, Fullerton College produced the greatest number of Associate in Arts degrees in Chemistry over the last five years, even when scaled for the size of the institutions (degrees per 1000 students). With the incredibly high demand for chemistry courses, supported by fill rates of nearly 100%, the Chemistry Department is making every effort possible to support the students of Fullerton College.

The faculty members of the Chemistry Department are heavily involved in both professional matters at the Division and College level along with State-wide activities to further the success of the students. The faculty of the Chemistry Department have assumed roles at multiple levels on the campus: Student Success Committee, Curriculum Committee, Institutional Research and Effectiveness Committee and the Executive Committee of the Academic Senate for California Community Colleges at the State level. Additionally, the faculty of the Chemistry Department are engaged in community activities (National Chemistry Week and Kindercaminata) and in several activities supported by grants and categorical funding (First Year Experience, Supplemental Instruction, Science Boot-Camps, and Peers in Undergraduate Mentoring Program). Each of these activities supports the community relations with the campus and the retention, success, and transfer of students in the program.

The Chemistry Department has assessed the program-level student learning outcomes (PLOs) and the data has been stored in eLumen. Analysis of the assessment data in eLumen has also demonstrated the need for greater consistency in the entry of the results from SLO assessments. Changes to the way SLO assessment data is collected and entered into eLumen should lead to improvements to the conclusions drawn from the assessments.

The faculty of the Chemistry Department have completed an evaluation of the statistical evidence collected by the Office of Instructional Research, the needs of the Department and Natural Science Division, and the activities the faculty are involved in to improve student success. With consideration to the significant growth that has been seen in the last few years, the Chemistry Department is requesting (1) the creation of a Campus STEM Resource Center, (2) facilities and faculty for continued growth of the program, (3) support for the laboratories and Chemical Stockroom, (4) support for PUMP, (5) support for the Science Boot Camps, (6) support for Supplemental Instruction, (7) creation of chemistry specific professional development for adjunct faculty, (8) support for community outreach activities, (9) support to create an Chemistry Department webpage, (10) support for equipment for classroom instruction. These strategic action plans will improve the chemistry program and will promote excellence in learning.

Chemistry is a central science. It is an essential component in the education of science, technology, engineering, and mathematics (STEM) students, and forms the basis for many of the remaining sciences. Chemistry is critically important to all science related curricula in community colleges and higher-level institutions, and is fundamental for all students who desire to major in the life or physical sciences, medicine, engineering and other disciplines that require technical knowledge. The study of chemistry stimulates technical and scientific experiences and fosters the development of well-informed scientific citizens in our community. The chemistry program supports and promotes scientific literacy benefiting the community, state and nation. At the same time, chemistry classes require a large amount of available resources which include availability to classroom and laboratory technology, laboratory maintenance, replacement of consumable items (e.g. chemicals), and disposal of hazardous wastes. The ability to offer chemistry courses is inherently expensive, but is an essential discipline at Fullerton College and, therefore, is in need of continual support.

9.0 Publication Review

Fullerton College is committed to assuring integrity in all representations of its mission, programs, and services. As such, during the program review self-study process programs are required to document their publications (websites, brochures, pamphlets, etc.), when they were last reviewed, and denote the publication is accurate in all representations of the College and program missions and services. In the far-right column please provide the URL where the publication can be accessed. If it cannot be accessed via the Internet, please contact Lisa McPheron, Director of Campus Communications at lmcpheron@fullcoll.edu.

Information on the college's graphic standards is available here: http://news.fullcoll.edu/campus-communications/web-help/graphics/.

Please identify when the publication was last reviewed, and confirm that it is accurate in how it represents the college. In the far-right column please provide the URL where the publication can be accessed. If it cannot be accessed via the Internet, please provide a sample of the publication with your program review self-study.

Publication	Date last reviewed	Is the information accurate?	URL of publication

For publications that you have identified as inaccurate, please provide the action plan for implementing corrections below.

Appendix A: Fullerton KPIs

	2013[13]				2014				2015				2016				2017				Total
	SU	FA	SP	Total	SU	FA	SP	Total	SU	FA	SP	Total	SU	FA	SP	Total	SU	FA	SP	Total	
ENROLLMENTS																					
Total	96	594	747	1437	139	676	772	1587	207	752	884	1843	186	713	948	1847	246	887	994	2127	8841
Female	45	289	364	698	69	297	380	746	116	379	430	925	101	368	463	932	136	476	488	1100	4401
Male	51	300	376	727	70	371	384	825	89	366	438	893	85	333	471	889	107	399	494	1000	4334
Diff. / Unk.		5	7	12		8	8	16	2	7	16	25		12	14	26	3	12	12	27	106
CHEM 100 F		54	69	123		56	74	130		51	73	124		46	73	119		48	73	121	1096
CHEM 101 F	24	50	98	172	23	72	99	194	49	73	93	215	47	72	96	215	72	98	130	300	2592
CHEM 103 F			67	67		23	49	72		56	81	137		46	64	110		39	42	81	1969
CHEM 107 F	23	201	168	392	75	202	196	473	76	216	225	517	69	214	273	556	87	267	300	654	1158
CHEM 111A F	24	131	161	316	24	155	170	349	57	144	188	389	50	146	224	420	71	201	223	495	617
CHEM 111B F	25	79	102	206	17	86	104	207	25	103	118	246	20	94	123	237	16	125	121	262	467
CHEM 201 F		26	22	48		26	23	49		45	22	67		36	25	61		39	25	64	289
CHEM 211A F		40	22	62		44	20	64		45	42	87		39	40	79		49	42	91	383
CHEM 211B F		13	38	51		12	37	49		19	42	61		20	30	50		21	38	59	270
PROGRAM AWARDS																					
Degrees Awarded	4	1	21	26	4	3	26	33	9	6	27	42	4	7	29	40	3	7	16	26	167
SECTIONS																					
Active Sections	4	24	32	60	6	27	32	65	8	31	37	76	8	31	39	78	11	37	42	90	369
Avg Census Size	24.0	24.7	23.3	24.0	23.2	25.0	24.1	24.1	25.9	24.2	24.0	24.7	23.5	23.1	24.4	23.7	22.4	24.1	23.7	23.4	24.0
Census Fill Rate	102.1%	100.9%	98.3%	100.4%	97.9%	106.6%	103.6%	102.7%	107.8%	104.3%	100.1%	104.1%	94.0%	96.4%	102.4%	97.6%	92.1%	98.7%	103.0%	97.9%	100.5%
Total FTES	26.5	160.9	199.1	386.5	34.9	173.9	202.4	411.3	53.8	196.1	230.9	480.7	51.1	195.3	258.4	504.7	71.5	247.7	275.7	594.9	2378
FACULTY																					
Total FTEF	2.1	11.4	14.3	27.8	3.0	12.7	14.6	30.3	4.1	14.4	16.7	35.2	4.1	14.4	18.0	36.5	5.6	17.2	19.2	41.9	34.4
WSCH per FTEF	384.4	421.7	416.7	416.6	345.5	411.4	415.4	407.6	396.6	408.5	414.7	410.2	376.9	406.8	430.2	415.8	385.4	431.6	431.8	426.4	415.8
RETENTION																					
Overall	93.75%	84.01%	83.13%	84.20%	84.89%	83.58%	83.81%	83.81%	87.44%	81.91%	82.81%	82.96%	83.87%	85.27%	80.80%	82.84%	88.21%	82.98%	83.90%	84.02%	83.54%
Female	97.78%	85.47%	82.14%	84.53%	82.61%	85.86%	81.84%	83.51%	86.21%	82.59%	81.16%	82.38%	81.19%	85.33%	81.21%	82.83%	87.50%	85.29%	84.84%	85.36%	83.75%
Male	90.20%	82.67%	84.04%	83.91%	87.14%	81.94%	85.68%	84.12%	88.76%	81.15%	84.02%	83.31%	87.06%	84.98%	80.25%	82.68%	88.79%	80.45%	82.79%	82.50%	83.25%
Diff. / Unk.		80.00%	85.71%	83.33%		75.00%	87.50%	81.25%	100.0%	85.71%	93.75%	92.00%		91.67%	85.71%	88.46%	100.0%	75.00%	91.67%	85.19%	86.79%
Nat. Am. / AK			100.0%	100.0%		50.00%	66.67%	60.00%	100.0%	100.0%	100.0%	100.0%		0.00%	100.0%	50.00%		100.0%	100.0%	100.0%	81.25%
Asian	97.22%	86.67%	88.51%	88.61%	89.74%	90.32%	90.57%	90.37%	89.83%	87.73%	80.39%	84.51%	91.49%	92.20%	85.65%	88.66%	91.67%	86.98%	85.58%	87.06%	87.69%
Black / A.A.	100.0%	83.33%	60.00%	75.00%	100.0%	92.31%	75.00%	83.33%	100.0%	85.71%	90.00%	88.89%	100.0%	100.0%	80.95%	88.57%	100.0%	78.57%	81.25%	82.35%	84.00%
Filipino	90.00%	93.55%	91.18%	92.00%	90.00%	84.62%	88.37%	87.34%	92.31%	89.47%	92.73%	91.51%	81.25%	85.71%	76.47%	80.39%	82.35%	82.35%	81.82%	82.11%	86.43%
Hispanic	96.43%	81.74%	78.98%	81.00%	80.77%	80.38%	81.79%	81.13%	81.01%	75.68%	79.95%	78.30%	79.01%	82.28%	75.44%	78.62%	85.23%	78.86%	84.73%	82.27%	80.25%
HI / Pac Is.		33.33%	100.0%	71.43%		100.0%		100.0%		100.0%	66.67%	75.00%		0.00%	80.00%	66.67%	100.0%	66.67%	80.00%	77.78%	75.00%
Multi	0.00%	90.00%	92.59%	89.58%	100.0%	90.63%	78.79%	85.92%	75.00%	84.38%	91.67%	85.94%	88.89%	80.77%	88.89%	86.25%	90.00%	88.24%	79.07%	83.91%	86.00%
Unknown	75.00%	82.35%	94.44%	87.18%	50.00%	82.61%	86.96%	82.00%	100.0%	90.00%	80.77%	86.79%	100.0%	85.71%	91.30%	89.80%	85.71%	86.21%	77.78%	82.54%	85.43%
White	93.33%	83.10%	81.52%	82.70%	85.19%	80.38%	81.88%	81.45%	94.59%	85.06%	87.88%	87.36%	80.00%	86.11%	84.34%	84.74%	89.36%	87.01%	82.72%	85.30%	84.38%
SUCCESS RATES																					
Overall	85.42%	73.06%	72.82%	73.76%	77.70%	73.67%	73.06%	73.72%	82.13%	71.01%	72.29%	72.87%	77.96%	73.07%	70.68%	72.33%	79.27%	69.90%	73.34%	72.59%	72.99%
Female	86.67%	75.43%	72.25%	74.50%	75.36%	77.44%	71.84%	74.40%	81.90%	72.56%	71.16%	73.08%	75.25%	70.92%	71.49%	71.67%	78.68%	70.17%	74.39%	73.09%	73.23%
Male	84.31%	71.00%	73.40%	73.18%	80.00%	70.62%	74.22%	73.09%	82.02%	69.13%	73.29%	72.45%	81.18%	75.08%	69.64%	72.78%	79.44%	69.17%	72.06%	71.70%	72.61%
Diff. / Unk.		60.00%	71.43%	66.67%		75.00%	75.00%	75.00%	100.0%	85.71%	75.00%	80.00%		83.33%	78.57%	80.77%	100.0%	75.00%	83.33%	81.48%	78.30%
Nat. Am. / AK			0.00%	0.00%		50.00%	66.67%	60.00%	100.0%	100.0%	100.0%	100.0%		0.00%	100.0%	50.00%		100.0%	100.0%	100.0%	75.00%
Asian	94.44%	78.67%	79.89%	80.83%	87.18%	77.42%	86.79%	82.72%	84.75%	79.14%	73.04%	77.00%	87.23%	87.23%	78.47%	82.62%	83.33%	78.13%	77.21%	78.50%	80.15%
Black / A.A.	50.00%	58.33%	30.00%	45.83%	100.0%	84.62%	50.00%	66.67%	100.0%	50.00%	70.00%	62.96%	66.67%	72.73%	76.19%	74.29%	100.0%	57.14%	62.50%	64.71%	64.00%
Filipino	80.00%	77.42%	85.29%	81.33%	80.00%	65.38%	74.42%	72.15%	84.62%	81.58%	83.64%	83.02%	81.25%	77.14%	66.67%	72.55%	70.59%	76.47%	68.18%	71.58%	76.15%
Hispanic	89.29%	68.49%	66.78%	68.63%	71.15%	70.19%	68.06%	69.17%	77.22%	62.92%	68.53%	67.08%	70.37%	66.07%	61.52%	64.28%	77.27%	59.70%	72.12%	67.30%	67.12%
HI / Pac Is.		33.33%	100.0%	71.43%		100.0%		100.0%		100.0%	66.67%	75.00%		0.00%	80.00%	66.67%	100.0%	66.67%	60.00%	66.67%	71.43%
Multi	0.00%	80.00%	81.48%	79.17%	100.0%	78.13%	69.70%	76.06%	75.00%	71.88%	70.83%	71.88%	88.89%	69.23%	82.22%	78.75%	80.00%	79.41%	69.77%	74.71%	76.00%
Unknown	75.00%	82.35%	88.89%	84.62%	25.00%	78.26%	78.26%	74.00%	85.71%	90.00%	57.69%	73.58%	80.00%	61.90%	78.26%	71.43%	71.43%	72.41%	77.78%	74.60%	75.20%
White	73.33%	73.24%	72.83%	73.02%	77.78%	74.68%	71.88%	73.62%	86.49%	75.97%	78.79%	78.37%	80.00%	77.78%	77.27%	77.66%	78.72%	81.36%	74.35%	77.83%	76.21%

[13] Academic Year (AY) is defined as Summer and Fall of the previous calendar year to Spring of current calendar year.

Appendix B: State-Wide KPIs

	2013	2014	2015	2016	2017	5-Yr Avg
Enrollment	129576	139451	150268	158780	163818	
Retention Rate	83.22%	83.06%	83.08%	83.58%	83.76%	83.36%
Success Rate	69.47%	69.18%	68.82%	69.52%	69.62%	69.33%

95% Interval[14]	2013	2014	2015	2016	2017
Retention Interval	73.21-93.23%	72.13-93.99%	71.82-94.33%	73.18-93.97%	72.96-94.55%
Success Interval	56.44-82.50%	54.95-83.40%	53.78-83.87%	55.84-83.20%	55.60-83.65%

Appendix C: Peer Institution KPIs

Enrollment	2013	2014	2015	2016	2017	5-Yr Avg.
Fullerton	1437	1587	1843	1847	2127	8841
LA City	920	1068	1154	1242	1091	5475
Modesto	1195	1457	1659	2139	1450	7900
SD Mesa	4445	4686	5376	5679	5449	25635
Santa Barbara	1514	1683	1706	1783	1709	8395

Retention	2013	2014	2015	2016	2017	5-Yr Avg. [15]	W. Std. Dev.[16]
Fullerton	84.20%	83.81%	82.96%	82.84%	84.02%	83.54%	0.62%
LA City	83.04%	77.25%	79.38%	80.60%	76.90%	79.36%	2.42%
Modesto	77.66%	75.63%	78.36%	79.38%	77.86%	77.94%	1.41%
SD Mesa	89.56%	86.81%	88.04%	87.62%	89.48%	88.29%	1.17%
Santa Barbara	88.97%	89.48%	90.04%	91.14%	92.28%	90.42%	1.32%

Success	2013	2014	2015	2016	2017	5-Yr Avg.	W. Std. Dev.
Fullerton	73.76%	73.72%	72.87%	72.33%	72.59%	72.99%	0.64%
LA City	73.37%	68.07%	68.98%	73.35%	68.47%	70.43%	2.66%
Modesto	57.66%	56.83%	57.56%	63.30%	59.93%	59.43%	2.86%
SD Mesa	77.84%	75.74%	77.59%	75.70%	77.70%	76.90%	1.10%
Santa Barbara	75.36%	78.73%	74.97%	75.72%	75.37%	76.03%	1.53%

[14] 95% confidence interval is defined as ±1.96 standard deviations from the mean rate within a specified academic year. Standard deviation is calculated across all chemistry programs offered by California community colleges.

[15] Five-year averages per institution are labeled as "totals" since they are defined as the percentage of students enrolled at time of census who either retained, succeeded, withdrew, or failed in/from the course over the five-year period.

[16] Weighted Standard Deviations from the mean rate within a specified campus

LA City	2013	2014	2015	2016	2017	5-Yr Avg.
Nat. Am	0.00%	0.00%	0.00%	0.24%	0.00%	0.05%
Asian	22.61%	23.22%	27.56%	23.27%	24.66%	24.33%
Black / A.A.	5.43%	5.71%	5.29%	4.83%	4.31%	5.10%
Hispanic	36.30%	41.48%	40.55%	43.08%	45.10%	41.50%
Pac. Is.	0.33%	0.19%	0.09%	0.08%	0.09%	0.15%
Multi	1.41%	1.69%	1.99%	1.93%	2.38%	1.90%
Unknown	6.52%	3.84%	3.12%	1.53%	2.38%	3.32%
White	27.39%	23.88%	21.40%	25.04%	21.08%	23.65%

Modesto	2013	2014	2015	2016	2017	5-Yr Avg.
Nat. Am	0.75%	0.14%	0.54%	0.37%	0.21%	0.39%
Asian	11.80%	13.11%	10.49%	10.61%	10.83%	11.27%
Black / A.A.	1.59%	0.89%	1.57%	1.64%	1.79%	1.51%
Hispanic	34.56%	38.85%	42.13%	45.11%	50.14%	42.66%
Pac. Is.	2.01%	1.51%	1.51%	2.01%	1.17%	1.66%
Multi	2.68%	3.02%	2.83%	1.45%	0.76%	2.09%
Unknown	8.54%	4.80%	4.34%	2.34%	1.03%	3.91%
White	38.08%	37.68%	36.59%	36.47%	34.07%	36.52%

SD Mesa	2013	2014	2015	2016	2017	5-Yr Avg.
Nat. Am	0.52%	0.30%	0.41%	0.39%	0.26%	0.37%
Asian	20.47%	22.13%	22.15%	21.78%	21.49%	21.63%
Black / A.A.	4.63%	4.50%	4.35%	4.47%	5.19%	4.63%
Hispanic	27.67%	28.98%	32.05%	32.79%	34.32%	31.38%
Pac. Is.	0.72%	0.36%	0.74%	0.53%	0.50%	0.57%
Multi	4.48%	5.16%	5.08%	5.97%	4.57%	5.08%
Unknown	5.22%	2.94%	2.12%	2.17%	1.58%	2.70%
White	36.29%	35.62%	33.09%	31.91%	32.10%	33.63%

Santa Barbara	2013	2014	2015	2016	2017	5-Yr Avg.
Nat. Am	0.40%	0.12%	0.59%	0.17%	0.29%	0.31%
Asian	9.25%	6.48%	5.51%	6.28%	7.20%	6.89%
Black / A.A.	0.92%	1.37%	0.76%	1.63%	1.35%	1.22%
Hispanic	31.90%	33.16%	35.35%	35.95%	36.28%	34.60%
Pac. Is.	0.20%	0.00%	0.00%	0.11%	0.18%	0.10%
Multi	4.49%	5.11%	6.62%	7.57%	6.44%	6.10%
Unknown	0.92%	6.60%	5.98%	6.34%	5.91%	5.25%
White	51.92%	47.18%	45.19%	41.95%	42.36%	45.54%

Appendix D: Tukey's HSD test for Peer Institutions

Tukey's HSD test for Retention Rate

		Homogeneous Subsets		
College	No. of terms	Subset 1	Subset 2	Subset 3
Modesto	24	79.84%		
LA City	18	82.55%	82.55%	
Fullerton	15		84.69%	
San Diego Mesa	26			88.66%
Santa Barbara	30			91.02%

Tukey's HSD test for Success Rate

		Homogeneous Subsets	
College	No. of terms	Subset 1	Subset 2
Modesto	24	61.86%	
Fullerton	15		75.02%
LA City	18		75.35%
San Diego Mesa	26		77.69%
Santa Barbara	30		77.91%

Analysis of variance (ANOVA) Test results indicate there were significant differences among the five community colleges in regard to their mean retention rate ($F(4, 108) = 27.08$, $p < .01$) as well as their mean success rate ($F(4, 108) = 24.35$, $p < .01$).

The table above illustrates the results of the Tukey's HSD tests. The mean retention rates and the mean success rates for the five colleges in homogeneous subsets are displayed. Set 1 included Modesto Junior College, Set 2, LA City College and Fullerton College, and Set 3, San Diego Mesa College and Santa Barbara City College. This indicated that there were no significant difference in their mean retention rate ($p > .05$) between San Diego Mesa College and Santa Barbara City College (Set 3); and these two colleges had significantly better retention rate ($p < .05$) than Fullerton College and LA City College (Set 2). These two colleges (Set 2), in turn, had significantly better retention rate ($p < .05$) than Modesto College (Set 1).

The Tukey's HSD tests for the mean success rate revealed two homogeneous subsets. Set 1 included Modesto College, Set 2, the remaining four colleges. This indicated that the mean success rates for Fullerton College, LA City College, Dan Diego Mesa College, and Santa Barbara (Set 2) were approximately equal (not significantly different, $p > .05$); and their success rates were significantly higher ($p < .05$) than that of Modesto College (Set 1).

Appendix E: Fullerton College Annual Ethnicity/Gender KPIs

Enrollment	2013	2014	2015	2016	2017	5-Yr Avg.
Nat. Am / AK	1	5	5	2	3	16
Asian	360	353	426	397	479	2015
Black / A.A.	24	30	27	35	34	150
Filipino	75	79	106	102	95	457
Hispanic	542	652	802	809	942	3747
HI / Pac. Is.	7	2	4	6	9	28
Multi	48	71	64	80	87	350
Unknown	39	50	53	49	63	254
White	341	345	356	367	415	1824
Total	1437	1587	1843	1847	2127	8841

Enrollment %	2013	2014	2015	2016	2017	5-Yr Avg.
Nat. Am / AK	0.07%	0.32%	0.27%	0.11%	0.14%	0.18%
Asian	25.05%	22.24%	23.11%	21.49%	22.52%	22.79%
Black / A.A.	1.67%	1.89%	1.47%	1.89%	1.60%	1.70%
Filipino	5.22%	4.98%	5.75%	5.52%	4.47%	5.17%
Hispanic	37.72%	41.08%	43.52%	43.80%	44.29%	42.38%
HI / Pac. Is.	0.49%	0.13%	0.22%	0.32%	0.42%	0.32%
Multi	3.34%	4.47%	3.47%	4.33%	4.09%	3.96%
Unknown	2.71%	3.15%	2.88%	2.65%	2.96%	2.87%
White	23.73%	21.74%	19.32%	19.87%	19.51%	20.63%

Female Enr.	2013	2014	2015	2016	2017	5-Yr Avg.
Nat. Am / AK	1	2			1	4
Asian	188	174	230	193	234	1019
Black / A.A.	11	15	14	13	17	70
Filipino	28	32	50	49	45	204
Hispanic	264	307	402	440	509	1922
HI / Pac. Is.	3	1	1	2	6	13
Multi	20	33	31	42	40	166
Unknown	16	26	26	26	47	141
White	167	156	171	167	201	862
Total	698	746	925	932	1100	4401

Male Enr..	2013	2014	2015	2016	2017	5-Yr Avg.
Nat. Am / AK		3	5	2	2	12
Asian	169	175	193	201	241	979
Black / A.A.	13	15	13	19	16	76
Filipino	47	47	55	51	48	248
Hispanic	275	341	391	361	421	1789
HI / Pac. Is.	4	1	3	4	3	15
Multi	27	37	28	37	47	176
Unknown	22	23	26	20	15	106
White	170	183	179	194	207	933
Total	727	825	893	889	1000	4334

Diff/Unk. Enr. [17]	2013	2014	2015	2016	2017	5-Yr Avg.
Asian	3	4	3	3	4	17
Black / A.A.				3	1	4
Filipino			1	2	2	5
Hispanic	3	4	9	8	12	36
Multi	1	1	5	1		8
Unknown	1	1	1	3	1	7
White	4	6	6	6	7	29
Total	12	16	25	26	27	106

[17] There were no students of either Native American / Alaska Native and Native Hawaiian / Pacific Islander ethnicities of Different / Unknown gender in the five-year period examined.

Female Ret.	2013	2014	2015	2016	2017	5-Yr Avg.
Nat. Am / AK	100.00%	50.00%			100.00%	75.00%
Asian	88.83%	90.80%	85.22%	90.16%	88.03%	88.42%
Black / A.A.	90.91%	86.67%	92.86%	92.31%	88.24%	90.00%
Filipino	89.29%	90.63%	90.00%	79.59%	82.22%	85.78%
Hispanic	82.95%	79.80%	78.61%	78.41%	83.30%	80.59%
HI / Pac. Is.	66.67%	100.00%	100.00%	100.00%	83.33%	84.62%
Multi	85.00%	81.82%	83.87%	78.57%	82.50%	81.93%
Unknown	93.75%	88.46%	76.92%	88.46%	85.11%	85.82%
White	80.24%	80.77%	84.80%	86.23%	88.56%	84.34%
Total	84.53%	83.51%	82.38%	82.83%	85.36%	83.75%

Male Ret.	2013	2014	2015	2016	2017	5-Yr Avg.
Nat. Am / AK		66.67%	100.00%	50.00%	100.00%	83.33%
Asian	88.76%	89.71%	83.42%	87.06%	85.89%	86.82%
Black / A.A.	61.54%	80.00%	84.62%	84.21%	75.00%	77.63%
Filipino	93.62%	85.11%	92.73%	82.35%	81.25%	87.10%
Hispanic	78.91%	82.40%	77.75%	78.39%	81.24%	79.77%
HI / Pac. Is.	75.00%	100.00%	66.67%	50.00%	66.67%	66.67%
Multi	92.59%	91.89%	89.29%	94.59%	85.11%	90.34%
Unknown	86.36%	73.91%	96.15%	90.00%	73.33%	84.91%
White	84.71%	81.97%	89.39%	84.02%	82.13%	84.35%
Total	83.91%	84.12%	83.31%	82.68%	82.50%	83.25%

Diff/Unk. Ret.	2013	2014	2015	2016	2017	5-Yr Avg.
Asian	66.67%	100.00%	100.00%	100.00%	100.00%	94.12%
Black / A.A.				100.00%	100.00%	100.00%
Filipino			100.00%	50.00%	100.00%	80.00%
Hispanic	100.00%	75.00%	88.89%	100.00%	75.00%	86.11%
Multi	100.00%	0.00%	80.00%	100.00%		75.00%
Unknown	0.00%	100.00%	100.00%	100.00%	100.00%	85.71%
White	100.00%	83.33%	100.00%	66.67%	85.71%	86.21%
Total	83.33%	81.25%	92.00%	88.46%	85.19%	86.79%

Female Suc.	2013	2014	2015	2016	2017	5-Yr Avg.
Nat. Am / AK	0.00%	50.00%			100.00%	50.00%
Asian	81.91%	84.48%	79.13%	84.46%	79.06%	81.55%
Black / A.A.	63.64%	73.33%	78.57%	84.62%	76.47%	75.71%
Filipino	85.71%	84.38%	82.00%	73.47%	71.11%	78.43%
Hispanic	69.70%	67.75%	67.91%	63.41%	66.60%	66.75%
HI / Pac. Is.	66.67%	100.00%	100.00%	100.00%	83.33%	84.62%
Multi	75.00%	69.70%	67.74%	71.43%	72.50%	71.08%
Unknown	87.50%	73.08%	69.23%	76.92%	76.60%	75.89%
White	71.86%	75.64%	75.44%	76.05%	81.59%	76.33%
Total	74.50%	74.40%	73.08%	71.67%	73.09%	73.23%

Male Suc.	2013	2014	2015	2016	2017	5-Yr Avg.
Nat. Am / AK		66.67%	100.00%	50.00%	100.00%	83.33%
Asian	80.47%	80.57%	74.09%	80.60%	77.59%	78.55%
Black / A.A.	30.77%	60.00%	46.15%	63.16%	50.00%	51.32%
Filipino	78.72%	63.83%	83.64%	72.55%	70.83%	74.19%
Hispanic	67.27%	70.38%	65.98%	65.10%	68.17%	67.36%
HI / Pac. Is.	75.00%	100.00%	66.67%	50.00%	33.33%	60.00%
Multi	85.19%	83.78%	78.57%	86.49%	76.60%	81.82%
Unknown	86.36%	73.91%	76.92%	60.00%	66.67%	73.58%
White	73.53%	72.13%	81.01%	79.38%	73.91%	75.99%
Total	73.18%	73.09%	72.45%	72.78%	71.80%	72.61%

Diff/Unk. Suc.	2013	2014	2015	2016	2017	5-Yr Avg.
Asian	33.33%	100.00%	100.00%	100.00%	100.00%	88.24%
Black / A.A.				100.00%	100.00%	100.00%
Filipino			100.00%	50.00%	100.00%	80.00%
Hispanic	100.00%	75.00%	77.78%	75.00%	66.67%	75.00%
Multi	0.00%	0.00%	60.00%	100.00%		50.00%
Unknown	0.00%	100.00%	100.00%	100.00%	100.00%	85.71%
White	100.00%	66.67%	83.33%	66.67%	85.71%	79.31%
Total	66.67%	75.00%	80.00%	80.77%	81.48%	78.30%

Appendix F: Fullerton College Five-Year Ethnicity/Gender/Age Data[18]

5-Yr Data	< 18	18-19	20-24	25-29	30-34	35-39	40-49	50+
Enrollment	52	1769	4735	1023	264	112	74	19
Retention	86.54%	86.83%	82.75%	81.33%	81.44%	75.00%	75.68%	78.95%
Success	76.92%	76.31%	71.64%	69.89%	70.83%	66.96%	64.86%	78.95%
Withdrawal	13.46%	13.17%	17.25%	18.67%	18.56%	25.00%	24.32%	21.05%
Failure	9.62%	10.51%	11.11%	11.44%	10.61%	8.04%	10.81%	0.00%

Withdrawal	< 18	18-19	20-24	25-29	30-34	35-39	40-49	50+
Nat. Am / AK F		0.00%	0.00%	100.00%				
Nat. Am / AK M		0.00%	14.29%				25.00%	
Asian F	27.27%	8.46%	11.98%	13.25%	31.03%	16.67%	11.11%	0.00%
Asian M	12.50%	10.32%	14.31%	16.11%	7.69%	0.00%	14.29%	20.00%
Asian U		7.14%	12.50%					
Black / A.A. F		11.11%	8.33%	6.67%	0.00%	0.00%		0.00%
Black / A.A. M	50.00%	17.65%	23.08%	27.27%				
Black / A.A. U		0.00%	0.00%					
Hispanic F	0.00%	19.44%	19.03%	25.37%	17.78%	27.78%	14.29%	0.00%
Hispanic M	14.29%	15.13%	22.04%	22.22%	26.19%	19.05%	25.00%	0.00%
Hispanic U		6.67%	17.65%	20.00%				
HI / Pac. Is. F		0.00%	0.00%	50.00%			50.00%	
HI / Pac. Is. M	0.00%	50.00%	14.29%	75.00%				
Multi F	0.00%	10.34%	20.90%	27.78%	20.00%	0.00%	25.00%	
Multi M	0.00%	3.23%	9.76%	13.33%	40.00%	100.00%		
Multi U			25.00%				50.00%	
Unknown F	0.00%	11.76%	16.44%	16.67%	0.00%	28.57%	25.00%	0.00%
Unknown M	0.00%	0.00%	19.57%	25.00%	9.09%	0.00%	0.00%	
Unknown U	0.00%	100.00%		0.00%			0.00%	
White F	11.11%	13.97%	15.15%	14.89%	20.69%	28.57%	25.00%	50.00%
White M	0.00%	8.76%	17.36%	15.57%	14.29%	47.37%	35.29%	20.00%
White U	0.00%	0.00%	14.29%	0.00%				
Total F	16.00%	14.65%	16.21%	18.27%	20.16%	23.73%	21.05%	25.00%
Total M	12.50%	11.77%	18.38%	19.08%	17.14%	26.42%	27.27%	18.18%
Total U	0.00%	8.11%	15.56%	11.11%			33.33%	

[18] CCCCO Data

Failure	< 18	18-19	20-24	25-29	30-34	35-39	40-49	50+
Nat. Am / AK F		0.00%	50.00%	0.00%				
Nat. Am / AK M		0.00%	0.00%				25.00%	
Asian F	0.00%	6.15%	7.93%	7.95%	3.45%	5.56%	0.00%	0.00%
Asian M	0.00%	7.12%	10.43%	12.08%	7.69%	0.00%	0.00%	0.00%
Asian U		7.14%	12.50%					
Black / A.A. F		11.11%	12.50%	13.33%	33.33%	0.00%		0.00%
Black / A.A. M	0.00%	29.41%	25.64%	36.36%				
Black / A.A. U		0.00%	0.00%					
Hispanic F	33.33%	12.65%	14.92%	14.93%	20.00%	5.56%	14.29%	0.00%
Hispanic M	42.86%	16.62%	11.07%	13.33%	9.52%	14.29%	50.00%	0.00%
Hispanic U		6.67%	17.65%	0.00%				
HI / Pac. Is. F		0.00%	0.00%	0.00%			0.00%	
HI / Pac. Is. M	0.00%	0.00%	14.29%	0.00%				
Multi F	0.00%	13.79%	7.46%	16.67%	30.00%	100.00%	0.00%	
Multi M	0.00%	3.23%	9.76%	13.33%	0.00%	0.00%		
Multi U			25.00%				0.00%	
Unknown F	0.00%	11.76%	13.70%	8.33%	12.50%	0.00%	0.00%	0.00%
Unknown M	0.00%	22.22%	8.70%	25.00%	0.00%	0.00%	0.00%	
Unknown U	0.00%	0.00%		0.00%			0.00%	
White F	11.11%	6.62%	9.09%	6.38%	3.45%	7.14%	8.33%	0.00%
White M	0.00%	6.57%	8.56%	8.38%	10.71%	10.53%	17.65%	0.00%
White U	0.00%	0.00%	0.00%	50.00%				
Total F		0.00%	50.00%	0.00%				
Total M		0.00%	0.00%				25.00%	
Total U	0.00%	6.15%	7.93%	7.95%	3.45%	5.56%	0.00%	0.00%

Appendix G: Peer Undergraduate Mentoring Program (PUMP) Data

Preliminary Assessment Results Summary – Spring 2017

Note: Every category assessed, resulted in positive results for FC PUMP students compared to FC students who did not participate in PUMP. This directly supports that goals are being met by PUMP.

The following has been summarized from data collected for the spring 2017 semester (last updated 3/26/2017).

1. A comparison, between two general chemistry cohorts (CHEM 111A), in which one cohort participated in PUMP and the other did not, was made. This comparison revealed that students who participated in PUMP, scored between 7 and 21% higher on chemistry quiz and exams, compared to students who did not participate in PUMP (Figure 1).
2. A similar comparison showed a 14% increase in course retention in favor of PUMP students (Figure 2).
3. Only 62% of students in the non-PUMP cohort had a grade of C or better, whereas, 87% of the PUMP cohort students had a grade of C or better (Figure 3).
4. Only 4% of PUMP students were failing CHEM 111A, however, over 20% of non-PUMP FC students were failing Chemistry 111A at the time of this assessment (Figure 4).
5. These data suggest PUMP is greatly benefiting Fullerton College STEM students in a several areas of student success.

Figure 1. Comparison Between non-PUMP and PUMP Student Performance

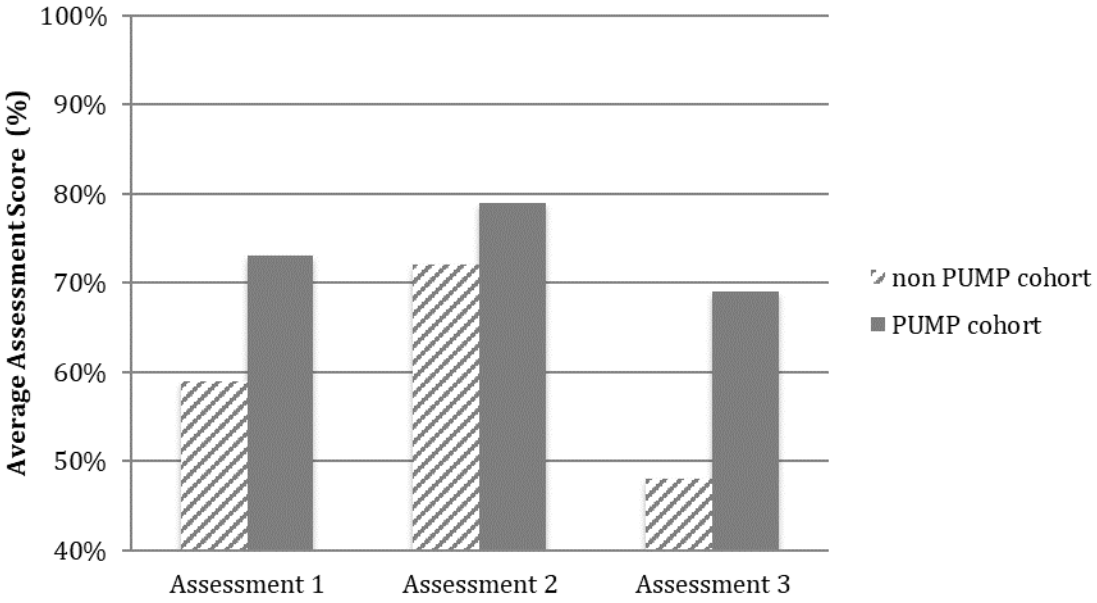


Figure 2. STEM Course Retention for non-PUMP vs. PUMP students

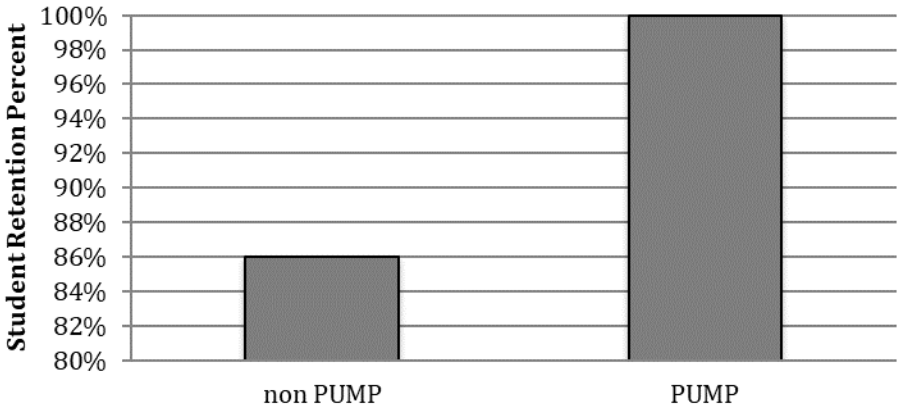


Figure 3. Students with a Course Grade of C or Better in Chemistry

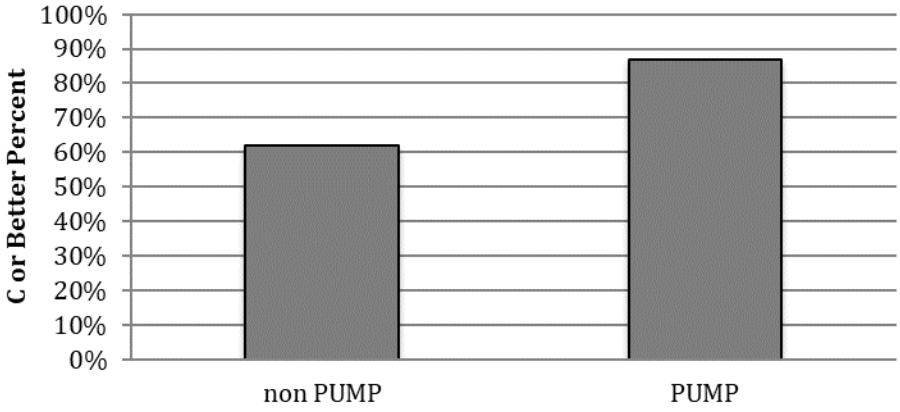
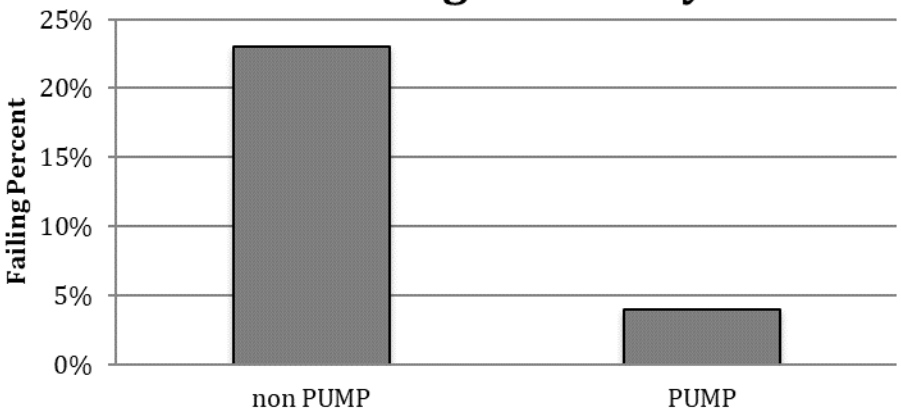


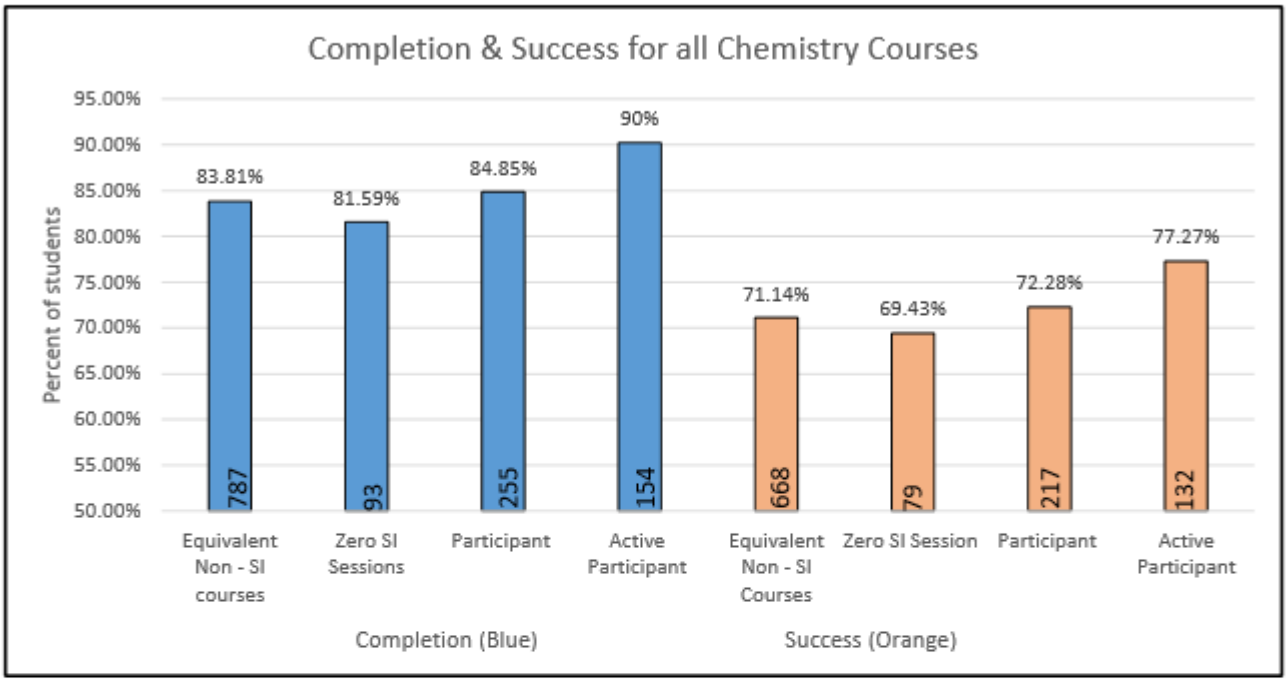
Figure 4.
Students Failing Chemistry 111A



Appendix H: Supplemental Instruction (SI) Data

Supplmental Instruction Chemistry Data Review

2016 - 2017 Academic Term



**The first column in each set is the control group of equivalent non-SI CRN's. The second column are students in the "SI Group" who choose to not attend any SI sessions. The third column is the "SI Participant" group (those who attend one or more sessions). And the fourth column are "Active Participants" (those that attend five or more SI sessions during the semester). Note that the "Active Participant Group" is a subset of the "SI Participant Group." The number listed inside the bar graph is the number of students who either completed (blue) or succeeded (orange)*

Highlights

73% of all students enrolled in a Chemistry class where SI was offered attended at least one SI session.

In the 2016 - 2017 Acdemic Term there were 510 total, 50 Minute Chemistry SI Sessions Offered and 2,354 Student Contact Hours

Number of Sections Offered		
Course	Fall 2016 & Spring 2017	Fall 2017
Chemistry 100	1	0
Chemistry 101	5	1
Chemistry 107	3	4
Chemistry 111A	1	0
Chemistry 111B	5	2
Chemistry 201	2	1

All chemistry SI courses have traditionally been funded by Equity Funds

Appendix I Boot Camp Data

Boot Camps Overall

Registered for At Least One Boot Camp: 120
Attended At Least One Boot Camp: 82

Demographics for All Boot Camp Attendees

	Count	*Percent*
Attended At Least One Boot Camp	**82**	**--**
Enrollment status		
Continuing student	77	94%
First-time transfer student	2	2%
Unknown	3	4%
Enrolled at		
Cypress College	3	4%
Fullerton College	76	93%
Unknown	3	4%
Race/Ethnicity		
American Indian or Alaskan Native	1	1%
Asian or Pacific Islander	24	29%
Hispanic	37	45%
White Non-Hispanic	15	18%
Unknown	5	6%
Gender		
Female	45	55%
Male	29	35%
Unknown	8	10%
Age		
Less than 20 years	38	46%
20-24 years	33	40%
25-29 years	3	4%
30-34 years	2	2%
35-39 years	2	2%
40-49 years	1	1%
Unknown	3	4%

CHEM 107 Boot Camps

Registered for CHEM 107 Boot Camps (Includes Wait List and Day of Registration): 28
Attended One or More CHEM 107 Boot Camps: 16
Attempted CHEM 107 in Spring 2016 or Summer 2016: 12

Demographics for CHEM 107 Boot Camp Attendees

	Count	*Percent*
Attended At Least One CHEM 107 Boot Camp	**16**	**--**
Race/Ethnicity		
American Indian or Alaskan Native	0	0%
Asian or Pacific Islander	5	31%
Hispanic	7	44%
White Non-Hispanic	2	13%
Unknown	2	13%
Gender		
Female	10	63%
Male	4	25%
Unknown	2	13%
Age		
Less than 20 years	11	69%
20-24 years	4	25%
25-29 years	0	0%
30-34 years	0	0%
35-39 years	1	6%
40-49 years	0	0%
Unknown	0	0%

Course Enrollment, Completion, Success and Average Grade Point for CHEM 107

	Fall 2015				**Spring 2016**				**Summer 2016**			
	Crs Enr	*Compl*	*Success*	*Avg GP*	*Crs Enr*	*Compl*	*Success*	*Avg GP*	*Crs Enr*	*Compl*	*Success*	*Avg GP*
No Boot Camp												
CHEM 107 F	213	89%	78%	2.36	265	84%	73%	2.15	85	89%	79%	2.69
CHEM 107 C	296	87%	78%	2.35	258	85%	77%	2.46	67	88%	82%	2.61
Attended One or More Boot Camp Sessions												
CHEM 107 F	1	0%	0%	0.00	8	88%	75%	2.00	2	100%	100%	3.00
CHEM 107 C	--	--	--	--	2	100%	100%	4.00	--	--	--	--

CHEM 111A Boot Camps

Registered for CHEM 111A Boot Camps (Includes Wait List and Day of Registration): 42
Attended One or More CHEM 111A Boot Camps: 24
Attempted CHEM 111A in Spring 2016 or Summer 2016: 22

Demographics for CHEM 111A Boot Camp Attendees

	Count	*Percent*
Attended At Least One CHEM 111A Boot Camp	**24**	**--**
Race/Ethnicity		
American Indian or Alaskan Native	0	0%
Asian or Pacific Islander	6	25%
Hispanic	11	46%
White Non-Hispanic	4	17%
Unknown	3	13%
Gender		
Female	10	42%
Male	11	46%
Unknown	3	13%
Age		
Less than 20 years	17	71%
20-24 years	5	21%
25-29 years	1	4%
30-34 years	0	0%
35-39 years	0	0%
40-49 years	0	0%
Unknown	1	4%

Course Enrollment, Completion, Success and Average Grade Point for CHEM 111A

	Fall 2015				**Spring 2016**				**Summer 2016**			
	Crs Enr	*Compl*	*Success*	*Avg GP*	*Crs Enr*	*Compl*	*Success*	*Avg GP*	*Crs Enr*	*Compl*	*Success*	*Avg GP*
No Boot Camp												
CHEM 111AF	146	84%	75%	2.28	203	79%	69%	2.07	71	92%	76%	2.35
CHEM 111AC	158	84%	74%	2.42	180	71%	58%	1.84	23	83%	74%	2.04
Attended One or More Boot Camp Sessions												
CHEM 111AF	--	--	--	--	21	86%	80%	2.14	--	--	--	--
CHEM 111AC	--	--	--	--	1	100%	100%	2.00	--	--	--	--

Grades in Fall and Spring for CHEM 111A Boot Camp Attendees

*Students Who Took CHEM 107 F in Fall 2015 and CHEM 111AF in Spring 2016

	CHEM 107 in Fall 2015		
CHEM 111A in Spring 2016	*A*	*B*	*C*
B	5	1	1
C	1	2	2
F	0	0	1
I	0	1	0
W	1	1	0

Grades in Fall and Spring for CHEM 111A Comparison Group – No Boot Camp

*Students Who Took CHEM 107 F in Fall 2015 and CHEM 111AF in Spring 2016

	CHEM 107 in Fall 2015		
CHEM 111A in Spring 2016	*A*	*B*	*C*
A	13	3	0
B	9	4	0
C	2	11	7
D	0	2	3
F	0	1	2
W	0	10	11

CHEM 111B Boot Camps

Registered for CHEM 111B Boot Camps (Includes Wait List and Day of Registration): 29
Attended One or More CHEM 111B Boot Camps: 24
Attempted CHEM 111B in Spring 2016 or Summer 2016: 22

Demographics for CHEM 111B Boot Camp Attendees

	Count	*Percent*
Attended At Least One CHEM 111B Boot Camp	**24**	**--**
Race/Ethnicity		
American Indian or Alaskan Native	1	4%
Asian or Pacific Islander	6	25%
Hispanic	12	50%
White Non-Hispanic	3	13%
Unknown	2	8%
Gender		
Female	11	46%
Male	9	38%
Unknown	4	17%
Age		
Less than 20 years	10	42%
20-24 years	12	50%
25-29 years	0	0%
30-34 years	2	8%
35-39 years	0	0%
40-49 years	0	0%
Unknown	0	0%

Course Enrollment, Completion, Success and Average Grade Point for CHEM 111B

	Fall 2015				**Spring 2016**				**Summer 2016**			
	Crs Enr	*Compl*	*Success*	*Avg GP*	*Crs Enr*	*Compl*	*Success*	*Avg GP*	*Crs Enr*	*Compl*	*Success*	*Avg GP*
No Boot Camp												
CHEM 111BF	94	78%	66%	1.86	101	82%	72%	2.08	16	94%	88%	2.75
Attended One or More Boot Camp Sessions												
CHEM 111BF	--	--	--	--	22	91%	91%	2.36	--	--	--	--

Grades in Fall and Spring for CHEM 111B Boot Camp Attendees

*Students Who Took CHEM 111AF in Fall 2015 and CHEM 111BF in Spring 2016

	CHEM 111A in Fall 2015		
CHEM 111B in Spring 2016	*A*	*B*	*C*
A	1	0	0
B	4	2	0
C	1	5	3
W	0	2	0

Grades in Fall and Spring for CHEM 111B Comparison Group – No Boot Camp

*Students Who Took CHEM 111AF in Fall 2015 and CHEM 111BF in Spring 2016

	CHEM 111A in Fall 2015		
CHEM 111B in Spring 2016	*A*	*B*	*C*
A	9	1	0
B	4	11	1
C	1	6	4
D	0	3	2
F	0	0	1
W	0	4	3

CHEM 201 Boot Camps

Registered for CHEM 201 Boot Camps (Includes Wait List and Day of Registration): 13
Attended One or More CHEM 201 Boot Camps: 11
Attempted CHEM 201 in Spring 2016 or Summer 2016: 11

Demographics for CHEM 201 Boot Camp Attendees

	Count	*Percent*
Attended At Least One CHEM 201 Boot Camp	**11**	**--**
Race/Ethnicity		
American Indian or Alaskan Native	0	0%
Asian or Pacific Islander	6	55%
Hispanic	3	27%
White Non-Hispanic	2	18%
Unknown	0	0%
Gender		
Female	9	82%
Male	1	9%
Unknown	1	9%
Age		
Less than 20 years	0	0%
20-24 years	8	73%
25-29 years	2	18%
30-34 years	0	0%
35-39 years	1	9%
40-49 years	0	0%
Unknown	0	0%

Course Enrollment, Completion, Success and Average Grade Point for CHEM 201

	Fall 2015				**Spring 2016**				**Summer 2016**			
	Crs Enr	*Compl*	*Success*	*Avg GP*	*Crs Enr*	*Compl*	*Success*	*Avg GP*	*Crs Enr*	*Compl*	*Success*	*Avg GP*
No Boot Camp												
CHEM 201 F	36	89%	72%	2.22	15	80%	73%	2.53	--	--	--	--
CHEM 201C	58	88%	83%	2.84	39	95%	92%	3.38	--	--	--	--
Attended One or More Boot Camp Sessions												
CHEM 201 F	--	--	--	--	10	70%	70%	2.50	--	--	--	--
CHEM 201 C	--	--	--	--	1	100%	100%	3.00	--	--	--	--

Grades in Fall and Spring for CHEM 201 Boot Camp Attendees

*Students Who Took CHEM 101 F in Fall 2015 and CHEM 201 F in Spring 2016

	CHEM 101 in Fall 2015	
CHEM 201 in Spring 2016	*A*	*B*
A	1	0
W	0	3

Grades in Fall and Spring for CHEM 201 Comparison Group – No Boot Camp

*Students Who Took CHEM 101 F in Fall 2015 and CHEM 201 F in Spring 2016

	CHEM 101 in Fall 2015		
CHEM 201 in Spring 2016	*A*	*B*	*C*
B	2	0	0
D	0	0	1

Initial, Final and Post Semester Survey Summary for a CHEM 111AF Boot Comp

A 3-day CHEM 107 F, Elementary Chemistry (a prerequisite for CHEM 111A F), General Chemistry I) review session (CHEM 111A F Boot Camp) was conducted a week before students began CHEM 111A. Participants were given a survey before the review session, after the review session and at the end of the semester to measure their progress. Six topics were measured and the results are shown in Figure 1 below. (Raw Data is in Table 1) **Note: Improvement in every topic resulted after the review session with the most improvement observed for the topic, 'solution preparation'.**

The following has been summarized from the assessment, comments and feedback sections of the survey:

1. 92% of participants surveyed were completely satisfied with the review session.
2. Pre and post assessment of key chemistry topics showed a significant improvement. An average of 57% was obtained before the Boot Camp, and 92% was obtained after the Boot Camp.
3. More than half (67 %) of participants surveyed felt the hands-on laboratory experience (chemical solution preparation) was the most helpful part of the review session.
4. Students surveyed would like to have more topic coverage for chemical naming, net ionic reactions, oxidation and solubility.
5. Participants suggested having the review session again in the future.

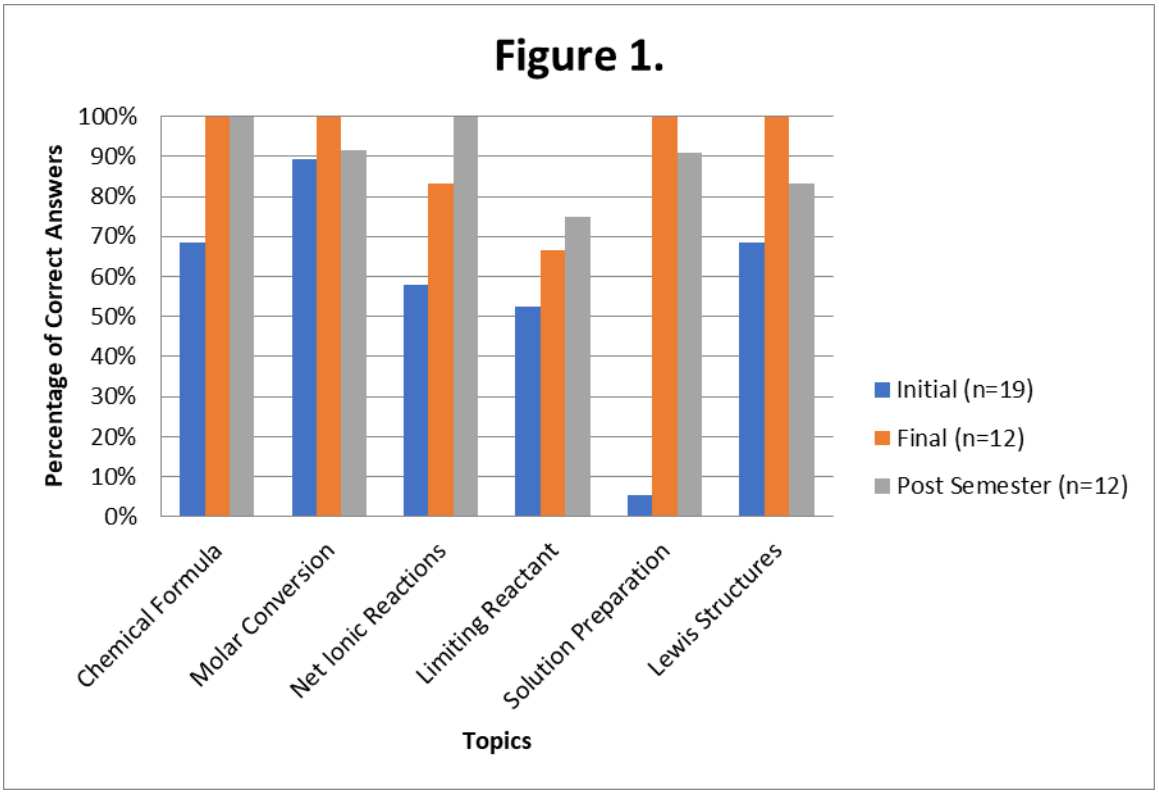


Figure 1. CHEM 107 Boot Camp participants were given a survey, which assessed six topics (x axis), before the session (initial, blue), after the session (final, red) and at the end of the semester (post semester, green) to measure their progress. n = the number of students who participated in the assessment. **Note: Improvement in every topic resulted after the review session with the most improvement observed for the topic, 'solution preparation'.**

Table 1: Raw Data Collected from CHEM 111A F Boot Camp

	Initial			*Final*			*Post Semester*		
Topic	**Correct Answers**	**Incorrect Answers**	**% Correct**	**Correct Answers**	**Incorrect Answers**	**% Correct**	**Correct Answers**	**Incorrect Answers**	**% Correct**
Chemical Formula	13	6	68%	12	0	100%	12	0	100%
Molar Conversion	17	2	89%	12	0	100%	11	1	92%
Net Ionic Reactions	11	8	58%	10	2	83%	12	0	100%
Limiting Reactant	10	9	53%	8	4	67%	9	3	75%
Solution Preparation	1	18	5%	12	0	100%	10	1	91%
Lewis Structures	13	6	68%	12	0	100%	10	2	83%
Total	65	49	57%	66	6	92%	64	7	90%

Routing & Response Page

Originator → IMS → Appropriate President's Staff Member → Program Review Chair

Originator

Electronically submit completed Program Review to Division Dean/IMS for review.

Appropriate Immediate Management Supervisor (IMS)

RESPONSE

Printed name of IMS	Title	Date

Select one and provide response if necessary. Forward electronically to appropriate Vice President's Office.

☐ *I concur with the findings contained in this Program Review.*

☐ *I concur with the findings contained in this Program Review with the following exceptions (include a narrative explaining the basis for each exception):*

Area of exception:

_____

_____

☐ *I do not concur with the findings contained in this Program Review (include a narrative explanation):*

_____

_____

Appropriate President's Staff Member

Acknowledging Receipt

Printed Name	Signature	Title	Date

Print Program Review, sign, and route both hard copy and electronic version to Program Review Chair.

Fullerton College Mission Statement

MISSION

Fullerton College advances student learning and achievement by developing flexible pathways for students from our diverse communities who seek educational and career growth, certificates, associate degrees, and transfer. We foster a supportive and inclusive environment for students to be successful learners, responsible leaders, and engaged community members.

VISION

Fullerton College will transform lives and inspire positive change in the world.

Approved by Fullerton College President's Advisory Council and accepted by President Schulz May 2017.

VALUES

Community
We promote a sense of community that enhances the well-being of our campus and surrounding areas.

Diversity
We embrace and value the diversity of our entire community.

Equity
We commit to equity for all we serve.

Excellence
We honor and build upon our tradition of excellence.

Growth
We expect everyone to continue growing and learning.

Inclusivity
We support the involvement of all in the decision-making process.

Innovation
We support innovation in teaching and learning.

Integrity
We act in accordance with personal integrity and high ethical standards.

Partnership
We work together with our educational and community partners.

Respect
We support an environment of mutual respect and trust that embraces the individuality of all.

Responsibility
We accept our responsibility for the betterment of the world around us.