

Chemistry Department

Program Review



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CERRITOS COLLEGE
Chemistry Department

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Program Description

The Cerritos College Chemistry Department is committed to the **Seven Circles of the College Strategic plan**. The department is made up of six full-time faculty and up to ten adjunct faculty.

Student Engagement

First and foremost our faculty is committed to student engagement both on and off campus. The faculty's first priority is the classroom. The instructors have endeavored to have a very engaging teaching style that causes students to learn by active learning in the classroom. The department has implemented the use of iPads at all levels of chemistry. The students have used the iPads to perform molecular modeling and create digital multimedia lab reports. The chemistry department has established relationships with several local universities such as USC and Cal State Long Beach where our students are encouraged to perform research. These students perform high level original scientific research and then present that research at various symposia. Last semester the department began a new relationship with a local chemical rubber company, where several instructors and 16 students spent a day touring the facilities. Our goal is to develop a relationship where our students could get involved in industrial internships to go along with our excellent academic research partnerships. The chemistry department is continually looking for opportunities to advance our excellent students!

Teaching Practices

Chemistry faculty constantly improve their teaching practices. Many conferences have been attended and presented at. As mentioned above the faculty frequently implement the use of technology. This technology affects the practice of teaching in many good ways. The chemistry department members have a strong professional relationship with each other, often spending copious amounts of time discussing the process of teaching and learning. Furthermore, the full-time faculty spend several hours each week mentoring new faculty and adjunct faculty. We aim to obtain good adjunct faculty and keep them. Based on research, teacher quality is the most important factor to improve student success. Training adjuncts will continue to be one of our priorities. Furthermore, the chemistry department is constantly seeking ways to improve instruction. Most recently the department acquired iPad Pros for each full-time instructor through the STEM Grant. The instructors now use these iPads as the platform for lecture.

Academic Infrastructure

Chemistry is a technology intensive subject. The department is continually researching and considering the implementation of chemical technology. Along with iPads and laptops the chemistry department employs chemical instrumentation such as analytical balances, infrared spectrometers, gas chromatographs and conductivity meters. This instrumentation is critical to maintaining a high level learning environment for our 21st century learners. The use of this type of instrumentation makes our students highly requested for summer research opportunities and internships. The recent STEM grant has allowed us to add a wide assortment of new equipment into our program and we are in the process of incorporating the newly acquired equipment into many of our courses. Currently we don't have a schedule for maintenance repair or replacement of this equipment. Our goal is to better develop and implement a maintenance program as this aspect of chemistry requires much extra time, knowledge, skill and effort on the part of faculty.

Instructional Programs

The chemistry department supports many other instructional programs and goals on this campus. The chemistry department is almost a 100% transfer department. Students take chemistry in order to transfer to the four-year university. Most of our students are pre-med, pre-pharmacy, pre-dental, pre-engineering. So any student taking Chemistry 110-212 is planning on transferring. This is the vast majority of our students. Many Chem. 100 students plan on transferring as well. Chem. 100 students also go into the nursing and dental programs on this campus. Chemistry is a prerequisite for classes in the biology department. The chemistry department is one of a few departments on this campus that has a course designed specifically for Elementary teachers, Chem. 105. Chemistry has a strong relationship with the teacher TRAC Program. Chem. 105 needs to be updated to 2 units and re-written to conform to the Next Generation of Science Standards (NGSS).

Support Services

Due to the large amount of materials and supplies used in the laboratory the chemistry department has a stockroom that is managed by an excellent support staff member who also oversees many student workers. Safety is a key issue in any chemistry class. Our support people are very well trained and constantly updating their skill and safety knowledge. We also utilize the success center to help us with hiring and scheduling tutors. We have had some difficulties with the hiring of tutors in a timely manner, so our goal is to improve that. Many of our students also regularly talk to the STEM counselors that were provided by the STEM Grant. They also regularly meet with Evangeline Reichwein for guidance within the STEM programs and we refer to her regularly.

Resource management

The Chemistry department has been actively involved in the now sun setting STEM grant. From this grant the department has obtained 60 iPads with carts for student use, 6 iPad Pros for faculty use. Faculty have trained other faculty in the successful use of the iPads. Two computer programs have been written just for our faculty to use with their students in Chem. 110. The department also maintains a budget for chemicals and technology. The allocation of this money is openly discussed and its use is prioritized by all full-time faculty members. Our goal is to stream-line the acquisition and maintenance timeline so that decisions are made with optimal time to research new equipment.

Campus Leadership

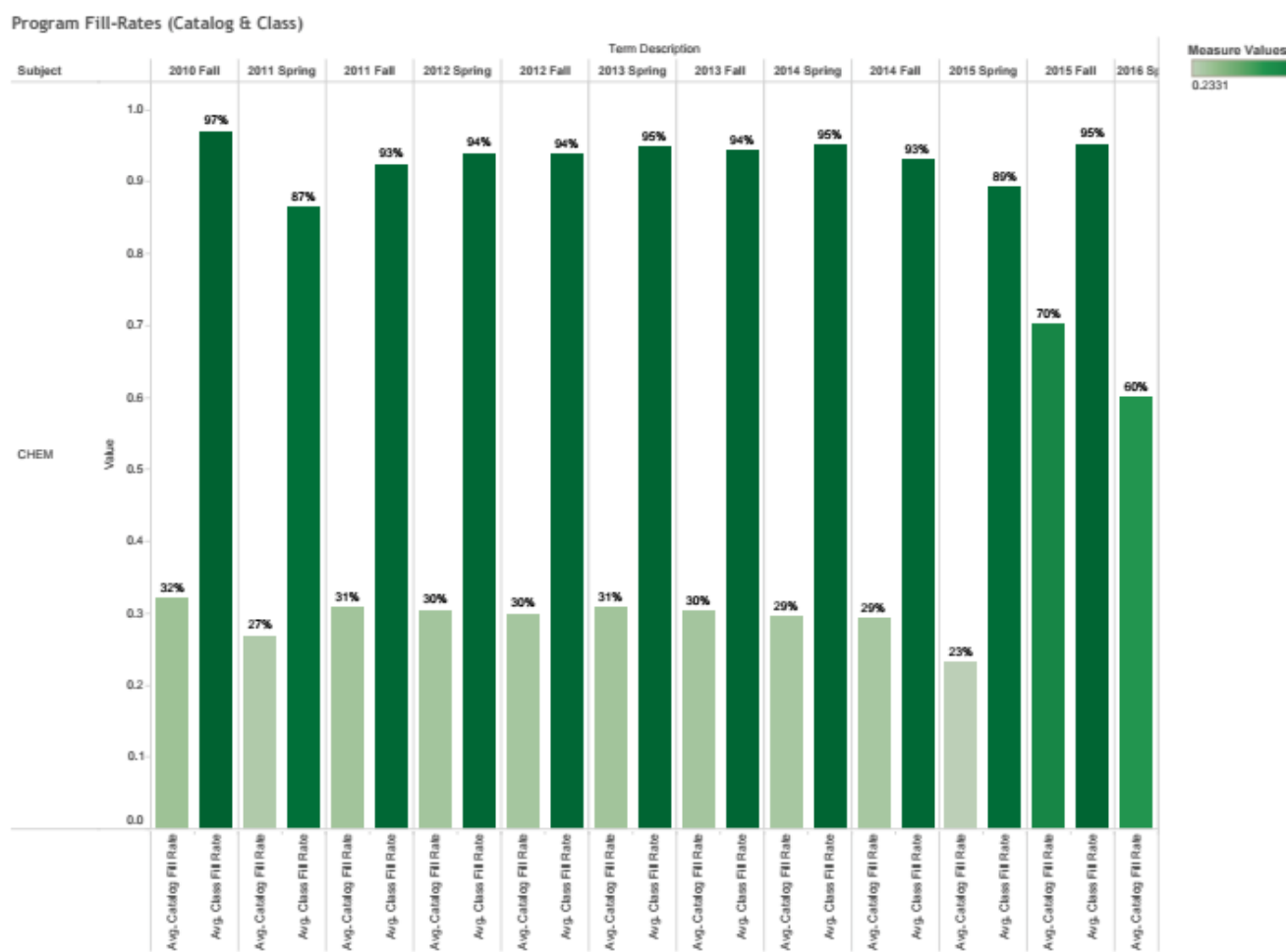
The chemistry faculty are very active across the campus. Currently members sit on committees such as the Academic Excellence Awards Committee and the Technology-Based Learning Committee and the CTX Advisory Board. One member of the department is currently on the Teacher TRAC Leadership team on campus as well as on the California Teacher Advisory Council at the state level. The department believes strongly in involvement in activities across the campus. Also faculty are involved in advising clubs such as the Biochem club and the ASET club.

Data Collection and Analysis

The chemistry department has collected and analyzed data from the Cerritos College Research Department (Appendix pages 14-21, Data Summary 1 and Data Summary 2) as well as surveys that are developed by the department and given each year to every student. In addition, the department is continually discussing student performance on exams. This is done formally at department meetings and informally in one-on-one conversations. Our faculty is committed to improving our student's chances of success.

The chemistry department runs full classes and is a very efficient department. From the table below it is clear that the department has as high as a 97% fill rate and is consistently in the 90% fill-rate range. Most recently in Fall 2016 the school noticed a dip in enrollment. The chemistry department was asked to add a nine-week chemistry class for the first time in the department's history. This is because it was expected that the class would boost enrollment.

Figure 1: Chemistry Department Fill Rates 2010-2016



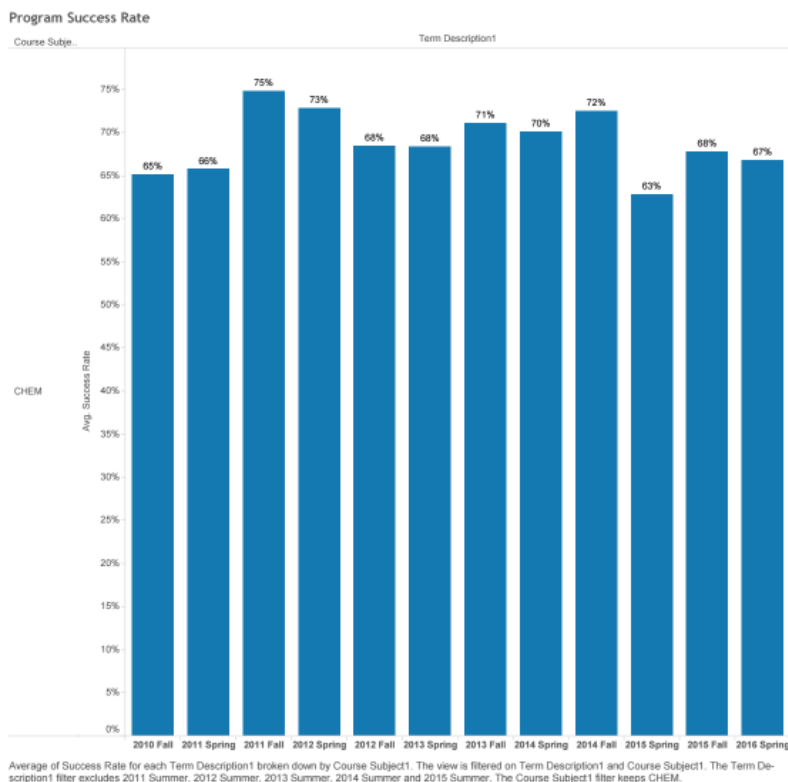
Avg. Catalog Fill Rate and Avg. Class Fill Rate for each Term Description broken down by Subject. Color shows Avg. Catalog Fill Rate and Avg. Class Fill Rate. The data is filtered on Catalog Number, which has multiple members selected. The view is filtered on Subject and Term Description. The Subject filter keeps CHEM. The Term Description filter excludes 2011 Summer, 2012 Summer, 2013 Summer, 2014 Summer and 2015 Summer.

Chemistry is perceived to be a challenging subject if not the most challenging. Nevertheless, the chemistry department at Cerritos College has a high course completion rate. The words "Organic Chemistry" often strikes fear in the mind of most students yet the completion rate for chemistry 212 is consistently in the high 90% range! Chemistry 100, which is a course designed for general education students, has a completion rate that is also in the 90% range.

The lowest successful completion rate is Chemistry 110. This is our entry level majors course. It is interesting that as the level of chemistry gets higher and more difficult the completion rate generally increases with a slight dip in the trend in Chemistry 211. The departments Success and completion rates are similar when studied for gender, age and ethnicity in all courses.

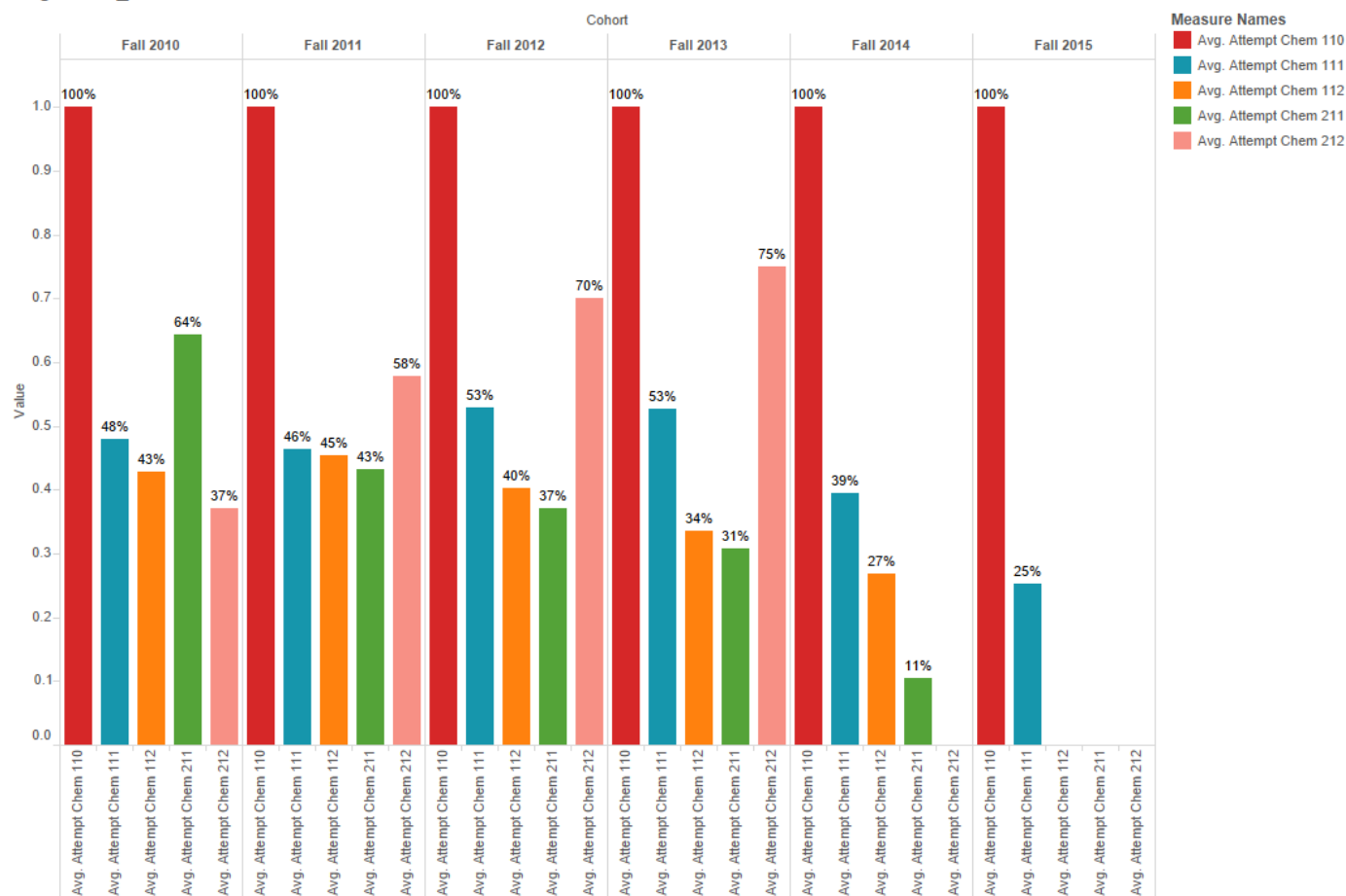
The chemistry department is very interested in student success. From the following graph which shows the program wide success rate we can see a cyclical pattern. It appears that every couple of years the success rate goes up and then drops and then goes up again. One explanation is that the Chem. 110 success rate is cyclical. At any given semester we have upwards of 240 students in Chem. 110 so that would affect the overall numbers. The major focus of our program review goals will be on improving student success in Chem. 110. We have seen success rates as high as two thirds. But in the Spring of 2016 the success rate in Chem. 110 dipped to just over half, which was intensely discussed by our faculty. We are working hard to develop ways to increase student success particularly in Chemistry 110. This class is a very important to the rest of the department since it is the entry level course. If there is a low success rate in Chem. 110, then that will affect the enrollment in all of the other courses above it. At the same time, we need to maintain the rigor of the course so that the students have a very strong background going into the other levels of chemistry. It should be mentioned that the completion rate of the SEM division is generally around 76% and the success rate of the division is generally around 58%. The chemistry department completion and success rates are often near 80% and 70% respectively. The chemistry department therefore is on the upper end of the division when it comes to completion and student success.

Figure 2: Chemistry Department Fill Rates 2010-2016



Student Course Progression: The department requested an analysis of the how a student cohort progresses through our chemistry series. There are two statistics that stood out. First, there is a very high drop in the number of students that continue from Chemistry 110 directly into Chemistry 111. This may have two major causes: limited success in Chemistry 110 and limited course offerings of Chemistry 111. Second is the large rate of successful enrollment in Chemistry 212 from 211. This can probably be attributed to both the type of student and the fact that the department has a good plan for course scheduling of the Organic Chemistry series (Chem 211 and 212).

Figure 3:
Progression_EnrollmentRate



Avg. Attempt Chem 110, Avg. Attempt Chem 111, Avg. Attempt Chem 112, Avg. Attempt Chem 211 and Avg. Attempt Chem 212 for each Cohort. Color shows details about Avg. Attempt Chem 110, Avg. Attempt Chem 111, Avg. Attempt Chem 112, Avg. Attempt Chem 211 and Avg. Attempt Chem 212. The view is filtered on Cohort, which excludes Null.

Student Learning Outcomes:

Currently, we are not compliant with all of our course SLO's. All of our courses have SLO's in place in our curriculum. Most of majors courses (110, 111, 112) except Organic Chemistry (211 and 212) have been completing assessments and analysis on a few SLO's annually as required during the fall semesters. We would like to make it possible to have all of these majors courses assess most if not all of the SLO's each year and we are close to that point now. The Organic Chemistry course SLO's need to be revised this semester to make the collection and recording of the SLO's on e-Lumen more feasible. Chemistry 100 is a large multi-section course has had its SLO's defined for several years and is expected to have SLO's collected this semester. The current course coordinator has recently designated the assignments that will comprise the SLO assessments. Other courses that have only recently added course SLO's are Chem 95, a tutorial course, Chemistry 250, an independent research course, and chemistry 105, Chemistry for Teachers. Chemistry 250 has had a fluctuating number of students, but has a maximum of 5, the projects that are assigned vary considerably, and the appropriate tool to assess the work is being developed. Chemistry 95 has recently been changed to 6 different courses due to issues of repeatability, because the course was not a standard course there were no SLO's readily associated with it. The new courses (95A, 95B, 95C, 95D, 95E, 95F) now have SLO's associated with each of the primary courses that the tutoring is needed for, so that the assessments will be able to be done more readily. Chemistry 105 is undergoing review and discussions are underway to find out the best plan for the future for students. The Chemistry 105 course has not been offered for several years for two major reasons. First, when we made cuts to classes, this was cut to save courses that were required by students for their majors (rather than an optional course.) Secondly the state was in the process of changing to the NGSS and the course did not follow that process, so it was not effective for students. The course will be looked at for possible changes.

Chemistry 100 has a new coordinator and the SLO's will be set by the end of this semester. In Chemistry 110 the recent SLOs were too large and do not give a clear picture of student understanding at specific points. We feel the SLO's need to be revised to give a better picture of the students' needs and where we can improve. Chemistry 211 and 212 are also being looked at for some changes to the way the SLO's are written in order to facilitate the collection of data on more of the SLO's.

Since our last program review we have begun incorporating SLO's into each course. We were asked to begin with just looking at one course at a time to improve those SLO's. We have completed writing SLO's for each course, but have been stymied by all of the changes to the requirements and ways of assessing our SLO's they are constantly changing and we try to adjust to those changes, but it means that we have to start over with some of our SLO's. That has caused us to not be in compliance with several courses. We are in the process yet again of adjusting our SLO's to improve our assessments so that all of our instructors can participate readily in the SLO process. Because of all of the changes to course SLO's Program SLO's have not been monitored at all and have not been linked to the course SLO's

SWOT Analysis

Strengths

1. Knowledgeable faculty that care about student success as a primary goal.
2. Faculty mentoring other faculty, especially adjunct faculty.
3. Faculty find opportunities for student research and summer internships.
4. Faculty use of instructional technology: iPads for presentation, tablets.
5. Faculty and student use of chemical technology such as infrared spectrometers, Vernier equipment, GC's MelTemps, spectrophotometers.
6. Faculty highly involved in the STEM Grant.
7. Involved in the STEM Open House.
8. Strong inter and intra departmental relationships which help us to schedule classes.
9. Strong partnerships with local universities.
10. Strongly promote student transfer.
11. Support a strong student network through tutors.
12. Department members constantly try to improve courses and experiments to improve student learning.
13. Faculty attend many conferences to improve pedagogy and use of technology.
14. A campus that generally supports a strong chemistry program.
15. A very supportive dean.
16. Excellent facilities.
17. Reasonable class size.

Weaknesses

1. Institutional data shows a downward trend in success in Chem. 110, with a low point in Spring 2016 at 53%.
2. Chem. 105 doesn't match student needs.
3. We don't offer enough courses to satisfy current student need.
4. Purchase and upkeep of equipment and facilities is sporadic and disorganized.

Opportunities

1. Partnerships with local chemical companies.
2. New technologies for instruction and chemical analysis.
3. We think raising Chem. 110 to five units, as is the case with many local community college campuses, could significantly improve our student success in Chem. 110.

Threats

1. Cost and time needed to acquire and maintain equipment.
2. Cost and time needed to develop skill for use of new technologies.
3. Difficulty in getting new permanent full-time faculty.
4. Sunsetting of STEM grant will cause changes in budgets and opportunity to try new ideas.
5. Time required mentoring adjunct faculty.
6. Many students need to spend much time working, and this impacts their success.
7. Low adjunct salary means it is hard to maintain them.
8. We are not sure how we will be affected by the Cal State University new acceptance of our Chem. 211 and 212. In the past only the UC campuses did.
9. Budgeting is often told that money is available at the last minute and we have to spend it right away. The school needs to come up with a better system of resource spending.
10. Having difficulty in the tutor hiring process due to the lack of institutional structure to support timely hiring.

11. Loss of current temporary full time replacement is predicted.
12. Adjunct course offerings are variable between semesters, due to unequal cuts and added courses.
13. Priority registration discriminates against some of our more qualified students from completing within a reasonable the timeline;
14. Our program places students over the maximum unit load
15. Cerritos College hiring/advertising/availability timelines inhibits the timely scheduling of adjuncts so we lose them.
16. Hiring practices for student tutors causes huge delays in the start date of tutors, affecting student success.

Goals

The abbreviations for faculty names used below are: JB = Jeff Bradbury, SB = Sean Bonness, RL = Rena Lou, AM = Amy Moskun (or other new faculty), CS = Cheryl Shimazu, LW = Linda Waldman, Olga = stockroom manager (Olga Dukhovny), Coordinator = whoever the current coordinator of that course is and Chair = whoever is the current chair.

Ref	Goal	Action to be Taken	Steps	Date	Person
W1, W3, T10, O3	Investigate and develop means to improve student success in Chem 110.	Research fifth unit in Chem. 110	Investigate to see whether getting a 5-unit course will help student success.	Fall 2017	RL
			Investigate which schools in our area have a 5 unit Chem. 110 and which do not?	Fall 2017	RL
			Ask the other schools what is the success rate at the schools that do have a 5 unit Chem. 110	Spring 2018	RL
			Compare rates of success and completion for various chemistry 110 unit courses.	Fall 2018	RL
			Find out what do these schools do with the time for that fifth unit.	Spring 2019	RL
		Research to see if we need to increase math prerequisite	Request more data that relates student success and completion in Chem 110 to their prerequisite math courses in math.	Fall 2017	CS
			Evaluate data to correlate math level with completion and success in chem. 110	Fall 2018	RL
			Investigate whether other schools have a higher math prerequisite and how that affects success	Fall 2017	RL
			Correlate the success and completion rates at schools have a higher math prerequisite and compare to our school.	Fall 2017	RL

Learn about our students through surveys	Come up with ideas/ questions for surveys	End of Fall 17	CS
	Write survey questions and conduct preliminary survey	End of Spring 18	CS
	Administer pre-post surveys	Pre-post per semester for 2 years	CS
	Compare success rate of students that have had prior chemistry (chem. 100, high school chem. Previous chem. 110) to those that have not.	End of Spring 2020	SB
	Analyze survey data	End of Spring 2020	CS/SB/AM
Learn about students through exams and quizzes comparing 2 courses (110 and 111).	Collecting data (110 quizzes, 110 final exam grades, 111 quizzes and exams that are reviews).	Each semester for 2 years	SB
	Use 3 data points on dimensional analysis/stoichiometry (first taught, 110 final, 111)	Each semester for 2 years	SB
	Analyze student work and look at most common student mistakes is there a “silver bullet” that could improve scores.	End of fall 19	SB
	Try to find the “predictor” of student success or failure in chem. 110.	End of Spring 20	SB
Correlate SLOs to success	Select SLOs that are student success indicators.	End of Fall 17	JB
	Write SLOs that incorporate student success indicators.	End of Spring 18	JB
	Discuss when we want to collect SLO data (at different times or only on the final?)	End of Spring 18	JB
	Collect data on revised SLO's.	End of Spring 19, and annually thereafter.	JB/coordinator

			Analyze how new SLO performance correlates with grades and student success.	Fall 2022	JB
			Analyze the main SLOs that are causing student failure and develop strategies to improve success.	Fall 2023	JB
		Improve training of adjuncts	Collect a list of misconceptions or common errors for all 4 slo's and use this to train our adjuncts and improve our lecture outlines.	Fall 2017	JB/coordinator
			Give adjuncts a list of common errors and how to teach to help students improve which becomes a preventative procedure	Fall 2018	JB
		Computer programs and technology	Edit 110 nomenclature & titration labs as needed.	Fall 2017	RL
			Research ways to use iPads and computers more and if we add a fifth unit use them in discussion.	Fall 2020	JB
			Incorporate Vernier technology into the 110 labs.	Spring 2018	CS
W2 W4	Determine if Chem. 105 should be scrapped, rewritten or left alone.	Align chem. 105 with current NGSS standards and find the correct number of units for student needs.	Meet with new Teacher TRAC coordinator to discuss future enrolment and needs for a Chem. 105.	Fall 2017	JB
			Meet with Cal State Long Beach Science education faculty to discuss chem. 105 future	End of Spring 2017	JB
			Research NGSS standards	Fall 2018	JB
			Make a decision about Chem. 105: Either rewrite chem. 105, if needed. Or remove class from catalog if needed.	Fall 2020	JB/LW

W2 W4 T1	Maintenance/ replacement/ acquisition of equipment (in coordination with the stock room)	Have a single form to request for equipment	Create desired/needed equipment form that includes links to requested items and contacts for quotes. Keep on Google Drive/Google Docs for all departmental members to access and edit.	End of Fall 2017	LW/Chair
			Review as department to prioritize needs	Annually, for DUAP	LW/Chair
		Develop a plan for maintenance (e.g. analytical balances)	Inventory current instrumentation in Google doc. Include maintenance needs in inventory (Call companies if needed)	S 2018	AM/Olga
			Assign point person for each piece of equipment and include in inventory list	S 2018	AM
		Replacement schedule	Contact manufacturers for expected lifetime of each type of equipment.	S 2018	AM
			Keep a running Excel/google doc log of purchased equipment, expected lifetimes and anticipated replacement dates and costs (update/review annually).	Monthly	LW/Chair
			Keep a running log of equipment that needs to be replaced due to damage. All of department can edit and discussed at dept. meetings.	Monthly	LW/Chair
		Building maintenance	Course coordinator takes care of the room in coordination with the stock room	As needed	All Coordinators Olga
			General maintenance requests for Building/ bathrooms doors etc.	As needed	LW/Chair

W3 O3	Scheduling for departmental courses	Know our students (their schedule, etc.); better understand our student population	Develop student survey to determine our “majors” needs	yearly	CS
			Develop student survey to determine number of attempts students have made before entering majors sequence and nursing chemistry classes	yearly	CS
			Analyze data from surveys	yearly	CS
			Correlate surveys + success data	End of Spring 2018	CS
			Correlate surveys with major requirements (chemistry course requirements for their majors)	End of Spring 2018	CS
			Follow a pipeline of students to see how long program actually takes	End of Spring 2018	CS
			Determine the % of students that actually move from 110 to 111 and 111 to 112 and 112 to 211 and 211 to 212.	End of Spring 2018	CS
			Develop a mathematical formula to help predict future course offering need approximately 2-3 semesters based on average data.	End of Spring 2018	CS
			Look at balancing course offerings annually courses from various angles.	End of Spring 2018	CS
		Increase our Adjunct pool	Reach out to local universities. Develop contacts in local universities (CSULB, CSUF, UCI, etc.). Identify community college teaching programs	Continually	LW/All
			Request PT faculty availability earlier	End of Spring 17	LW
		Increase the number of full time faculty	Write a faculty request with data from surveys	Fall 18 and annually	LW

Appendix A: Annual Student Learning Outcome (SLO) Assessment Goals

To complete the table, answer the questions for each academic year since your last six-year Program Review. We used ISLO's that were similar to CSLO's to find the total number of General ed SLO's

Degree and/or Certificate SLO(s)				
Academic Year	Number of Degrees and/or Certificates Offered by the Department	Number of Degrees and/or Certificates Assessed by the Department	Number of Degree and/or Certificate SLOs identified by the Department	Total Number of Degree and/or Certificate SLOs Assessed by the Department
2010	4	0	89	0
2011	4	0	89	0
2012	4	0	89	0
2013	4	0	89	0
2014	4	0	89	0
2015	4	0	89	0

Course SLO(s)				
Academic Year	Total Number of Courses Offered by the Department	Total Number of Courses Assessed by the Department	Total Number of Course SLOs offered by the Department	Total Number of Course SLOs Assessed by the Department
2010	9	1 (not on eLumen)	20	3
2011	9	3	30	13
2012	9	1	30	1
2013	9	0	42	0
2014	9	3	42	16
2015	9	4	46	21

**Cerritos College
Instructional Program Review**

Appendix B: Instructional Program Review Planning Form

This form is to be prepared by each program under review and submitted by March 31 in the year prior to the review year.

Program Name Chemistry Department

Evaluation Team: Chair: _____
Members: _____

Date Submitted _____

Date of Visitation _____
(The visitation date will be assigned by the IPR committee)

Due date for Final Self Study Report _____
(Two weeks prior to the visitation date)

Due date for Draft of Self Study Report _____
(Six weeks prior to the visitation date)

Submitted By _____ Linda Waldman, PhD _____
Chemistry Department Chair

Reviewed by _____
Division Dean

Reviewed by _____
IPR Committee Chair

**Cerritos College
Instructional Program Review**

Appendix C: Instructional Program Review Submittal Form

This form is completed and submitted as a cover sheet for the self-study report

Name of the Program Chemistry Department

Date Submitted 01/10/17

Scheduled Presentation Date _____

All courses in the program have been reviewed by the Curriculum Committee within the last six year cycle. Yes No

The Program is in compliance with guidelines established by the Student Learning Outcomes task force. Yes No

Explain any exceptions for non-compliance with Curriculum or SLO requirements:

Self-Study Prepared by: **The Cerritos College Department of Chemistry**

Reviewed by (Division Dean): _____

Cerritos College
Instructional Program Review
Appendix D: Curriculum Committee Program Review Checklist

Indicate which course outlines you have reviewed in the last three years? (Review ALL of your courses, including those not currently being offered.) You can update content, texts, objectives, assignments, methods of instruction (except distance education), and student learning outcomes without a trip to the Curriculum Committee, but updated outlines –even if just a text update-- still should be sent to the Academic Affairs Office.

- List courses that have NOT been offered in the last three years. (Should they be inactivated?)
 - *Chemistry 105 – this is one of our goals to decide what change will benefit the students the most.*
- List courses with pre-requisites/co-requisites? Have you reviewed the requisites to assure that they are still necessary and the courses are being offered. Hint: Look at the current student learning outcomes of those courses: at least two should be needed to justify the requisite. Requisites outside your discipline require periodic statistical validation to assure there is no disproportional impact on demographic groups.
 - *Chem 95 Corequisite is enrollment in a chemistry course.*
 - *Chem 100 and Chem 110 Prerequisite are math and have been reviewed.*
 - *Chem 111 prerequisite is High School Chem or Chem 110 with a C or better, has been reviewed.*
 - *Chem 112 prerequisite is Chem 111, has been reviewed.*
 - *Chem 211 prerequisite is Chem 112 and has been reviewed.*
 - *Chem 212 prerequisite is Chem 211 and has been reviewed.*
 - *Chem 250 prerequisite is Chem 111 and has been reviewed.*
- Do all of your course outlines list CURRENT texts and student learning outcomes? Note that whenever you update content, textbooks, student learning outcomes a new outline should be sent to the Academic Affairs Office; the office should NEVER have an out-of-date outline. These types of changes do not require Curriculum Committee approval.
 - *All Course outlines are current and use current texts with the exception of Chemistry 105 which will either be inactivated or revised soon.*
- Do you offer any courses as distance ed (hybrid or online)? Have they been approved for distance ed delivery by the Curriculum Committee? Do the courses you have been offering as distance ed for some time still match the delivery methods you outlined in your original proposals? Substantial changes require approval.
 - We currently have no distance ed courses.
- List the current degrees and certificates for your program. Have all the required courses (whether in your discipline or elsewhere) been offered in the last two years? Have enough electives been offered in the last two years? Are any electives (whether in your discipline or elsewhere) NOT being offered any more? Does the degree/certificate need updating? Note that every course SHOULD be attached to a new or existing degree/certificate, even if just as an elective. There ARE valid exceptions: check with the Curriculum Chair.
 - *There are four degrees available:*
 - *All basically require the same (1) major requirements, (2) the A.A. Degree General Education requirements, and (3) electives to achieve a minimum of 60 units.*
 - *Chemistry-AA - (CHEM-AA)*
 - *Chemistry/Tran-AA - (CHEM-TR)*
 - *Chemistry/Tran-AB - (CHEM-TR_AB)*
 - *Chemistry/Tran-AC - (CHEM-TR_AC)*
 - ❖ *General Chemistry 111*
 - ❖ *General Chemistry 112*
 - ❖ *MATH 170 Analytic Geometry and Calculus I*
 - ❖ *MATH 190 Analytic Geometry and Calculus II*
- Elsewhere in the program review there should be a look at whether there are students completing degrees/certificates.
 - *Limited numbers of students are completing the Chemistry degrees.*