



Barstow Community College
**INSTRUCTIONAL
PROGRAM REVIEW**

(Refer to the [Program Review Handbook](#) when completing this form)

PROGRAM:

Academic Year: **FULL PROGRAM REVIEW** **Date Submitted:**

Academic Year: **ANNUAL UPDATE #1** **Date Submitted:**

Academic Year: **ANNUAL UPDATE #2** **Date Submitted:**

By:

Faculty Lead:

Members:

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[Annual Update #1](#)

[Annual Update #2](#)

1. Program Mission and Vision

A. Program Mission

The mission of the Department of Chemistry is to provide students with an environment that encourages them to examine the physical universe, to spur an intellectual curiosity based on the development of an understanding and appreciation of the scientific method that will lead to the ability to apply logical, quantitative, and qualitative reasoning in scientific problem solving and analyzing scientific arguments, a skill which has great use in and beyond the classroom.

B. Program Vision (*Where would you like the Program to be three years from now?*)

The Department of Chemistry strives to achieve and maintain excellence in student learning and success.

C. Describe how mission and vision align with and contribute to the College's Mission and Vision

“Barstow Community College is an accredited, open access institution of higher learning committed to providing our students, community, and military population with the educational tools to achieve personal goals and professional growth.” The Department of Chemistry develops the reasoning and problem solving abilities of our students, a mission which aligns with the mission of Barstow Community College by giving the students valuable tools to use to achieve their goals, tools that they will carry with them beyond the classroom, into their lives and careers. Chemistry offers a unique classroom experience, as do many sciences, due to the incorporation of a laboratory component. The different learning atmospheres in the classroom and the lab offer the opportunity to explore different learning styles, as well as the opportunity for the students to communicate and work with each other and with the professors toward common goals

“Empowering Students to Achieve Their Personal Best Through Excellence in Education.” By maintaining a standard of excellence in student learning and success, the vision of the Department of Chemistry clearly aligns with the vision of Barstow Community College.

2. Program Description and Overview

Assume the reader does not know anything about the Program. Describe the Program, including—but not limited to—the following:

A. Organization, including staffing and structure

The Department of Chemistry currently consists of one full-time instructor and one part-time instructor. The only course currently offered is Chem 1: Introductory Chemistry. The class consists of two and a half hours of lecture and two hours and fifty minutes of lab each week.

B. Who do you service (including demographics)?

This course is designed for students, whose career goals lie in the allied health fields, especially nursing. The students are very diverse in age, ethnicity, socioeconomic status, and in educational background.

C. What kind of services does your unit provide?

The class is offered on the BCC campus both day and night to accommodate student's schedules. It is a pre-requisite for other classes, such as microbiology, that are requirements for allied health students

D. How do you provide them?

All sections of the class are traditional classes. The possibility of hybrid classes will be explored once the enrolment in the traditional classes grows sufficiently.

E. Does the program have a degree or certificate?

There is no Chemistry degree nor certificate available at BCC yet.

3. Program Data

A. PERFORMANCE DATA

Discuss the program’s performance on the specific data items listed below:

1) Full-time/Part-Time Faculty Ratio

1:1

	TRADITIONAL	ONLINE
2) Course Completion Rate	82%	0%
3) Course Success/Retention Rate	66%	0%
4) WSCH/FTEF Ratio		
Full-time:	251.4	0
Part-time:	300.0	0
5) Fill Rate	88%	0%

Reflect on the data above:

An 82% course completion rate for Introductory Chemistry is a reasonable number for such a class of this particular subject matter, but a 66% success/retention rate is low. The fill rate for a class that is necessary as a prerequisite for core pre-nursing courses should be significantly higher than 88%.
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B. PROGRESS ON PROGRAM LEVEL OUTCOMES (PLOS) AND STUDENT LEARNING OUTCOMES (SLOS)

1) List your Program Level Outcomes (PLOs).

<ol style="list-style-type: none"> 1. Demonstrate knowledge of natural phenomena and recognize the processes that explain them. 2. Demonstrate knowledge of scientific methodologies when solving a problem. 3. Apply formal systems of reasoning, critical thinking, and mathematical methods in solving or analyzing problems.

2) Summarize the progress you have made on Program Level Outcomes.

Program level outcomes continue to be examined, and student learning outcomes are assessed each semester for each class.
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3) Summarize the progress made on course-level outcomes and assessments; use specific data, if possible.

No data.

- 4) Describe any program, course, and/or instructional changes made by your program as a result of the outcomes assessment process.

No major changes have been made. The students continue to be encouraged to visit the tutoring center for assistance.

- 5) Reflecting on the responses for #2 and #3 above, what will you implement for the next assessment cycle?

For the next assessment cycle, a new set of SLOs will be submitted to committee for approval that are more current and aligned with the new direction that Introductory Chemistry is taking.

C. SUPPORTING ASSESSMENT DATA (See Handbook for additional information)

- 1) Provide a list of any additional measures (not included in 3.A.) that you have chosen to gauge your program's effectiveness (e.g.: transfers, degrees, certificates, satisfaction, student contacts, student headcount, Perkin's data, etc.).

The most appropriate measure of success at this point in the Department of Chemistry will be to monitor enrolment in the Introductory Chemistry course. Once the course is accepted for transfer into nursing programs, the number of students that transfer to these programs could potentially also be used as a measure of success.

- 1a) If this is a CTE program ending with a certificate or degree, include data on employment opportunities, compliance with advisory recommendations, and fiscal viability of program. (Include labor market and demand information using resources in CTE and the PR Handbook.)

N/A

- 2) Summarize the results of the measures listed in #1 above:

There are no results to discuss at this point. Enrolment trends will need to be examined over the next few semesters and will be discussed in the annual updates.

- 3) What did you learn from your evaluation of these measures, and what improvements have you implemented, or do you *plan* to implement, as a result of your analysis of these measures? (*List any resources required for planned implementation in #10: Resources.)

Chemistry at BCC has historically been a class that students avoid. By monitoring the growth of student enrolment, it will potentially be shown that the class is successful in producing well-prepared students. With a larger student population in the program, data from student assessment will be more accurate and meaningful.

D. TWO YEAR SCHEDULING PLAN

- 1) What is the program's Two-Year Scheduling Plan?

Currently the only course offered by the Department of Chemistry is Chem 1: Introductory Chemistry. Multiple sections of this course are offered each semester.

2) What changes, if any, have been made since the last Program Review?

No changes have been made to the chemistry course offerings since the last program review.

3) How effective has the Two-Year Scheduling Plan been in meeting student needs and educational goals? If this is a degree or certificate pathway, can students complete in two years?

The plan has been effective in meeting student needs since Chem 1 is a course needed to achieve student goals and it is available each semester.

4) Reflecting on the responses above, what are the goals for the next program review cycle?

Additional chemistry courses will need to be offered starting with a General Chemistry course. The demand for this will be examined. The demand for a hybrid Introductory Chemistry course will also be examined.

4. Curriculum

A. List any new courses or program changes since the last program review. Be sure to include if any new courses have approved prerequisites or corequisites.

No new courses have been added to the chemistry program.

B. Verify currency of curriculum: Other than above, what changes have been made in the curriculum since the last full program review? (*Updates, delivery mode changes, archives, deletions, revisions, etc.*)

No changes have been made in the curriculum of the Chem 1 course.

1) **CURRICULUM CURRENCY:** Verify that all Transfer Level Courses are current and aligned for transfer. (May require reviewing ASSIST or meeting with Articulation Officer.)

Chem 1 is transferable as a general education course at the CSU level, and is a course that is accepted as an IGETC requirement.

2) **CURRICULUM DEVELOPMENT:** Verify that all textbooks on Course Outlines of Record (COR) are up to date. Normally, textbook editions should be within five years for articulation. (Contact Articulation Officer for additional information.)

The textbook that is listed on the COR is the book currently used in the Chem 1 course and it has a copyright date of 2007. A more current book is in the process of being adopted for this course.

- C. List any courses not in full compliance with appropriate guidelines, including ASSIST, C-ID, Curriculum Committee, prerequisite validation, etc. (NOTE: Any courses that have not been updated in the past six years may not be in compliance. See Curriculum Manual or Articulation Officer for additional information, if necessary.)

The course is in compliance.

- D. Curriculum Development: What is the plan for maintaining the currency and viability of your curriculum (including all modes of delivery)?

The COR for Chem 1 is currently being examined to remedy the issues that caused the course not to transfer to certain nursing programs. The implementation of a new textbook with chapters covering both organic chemistry and biochemistry is imperative to this goal. Chem 1 will continue to be delivered as a traditional class and a hybrid option will be examined when the time is appropriate.

5. Internal Factors (see Handbook for additional information)

- A. **Strengths:** Current aspects of the program or department that serve it and its future well. These aspects include what it does well, what it's known for, what it takes pride in, and so forth. Strengths represent competencies or characteristics that the department or program may wish to enhance or preserve actively, even aggressively.

One strength of the Chemistry department is the holistic approach that it provides with the other science departments at the college. The science professors share many of the same students in a given semester, and can work together to ensure the students' successes in their chosen program. This instills a perception of a unified team within the whole science department, and it instills an understanding that the classes that the students take do not stand on their own, but are part of a bigger picture where all sciences are tied together. Another strength of the department is the recent hire of a full-time faculty member committed to improving and growing the department.

- B. **Weaknesses:** The program or department's *internal* vulnerabilities. These are areas that, if not addressed, could become liabilities, or could contribute to an erosion of the department's capacities and future growth. They represent areas where the organization needs to improve if it is to be successful for the long term.

One of the largest weaknesses of the Chemistry Department is the fact that the only class offered currently does not transfer to the closest nursing programs. Students at BCC have to take Chem 1 in order to fulfill prerequisites for other pre-nursing courses, but then have to take Introductory Chemistry again elsewhere so that the units transfer. This issue causes students to take the class at a college where it is transferable which in turn causes the class enrolment at BCC to be significantly lower than it should. The students that do take Chem 1 at BCC are frustrated at its lack of transferability into their desired programs. Another weakness is that there are no chemistry classes offered for majors. This deters any student interested in the physical sciences from coming to BCC for their continuing education. In addition, certain instruments that are currently used in experiments for the course are extremely out-dated and do not give the students any experience working with instruments that are actually used outside of BCC. The department has very few spectrometers and some are broken so there are not enough spectrometers for the students to use in lab. As stated above, the textbook hasn't been updated in years, and its last copyright was in 2007. A new text book needs to be adopted for this course that is a more up-to-date book. While the content changes little in chemistry at this level, the applicability does and a book that discusses current trends in science and everyday life is imperative. No Supplemental Instruction exists for the chemistry program and currently there is little to no interaction between the tutors and the chemistry

faculty. The availability of supplemental instruction has been shown to increase student course success for the courses that offer SI, and studies have also shown a correlation between hours spent in tutoring, both one-to-one and in tutor run workshops, and course grades/success. Chemistry is an inherently difficult subject, which lies at the core of the majority of the other science classes that students take, indicating that an understanding of chemistry is not necessary only for chemistry, but also for biology, biochemistry, and microbiology at a minimum.

6. External Factors *(see Handbook for additional information)*

- A. Opportunities:** *Current trends and events occurring **outside** the department that, if taken advantage of, are likely to have a positive effect on its long-term success. Examples may include: realistic training opportunities; industry trends; revenue-generation opportunities; development of new tools or technology to help manage workload.*

The majority of the students that take Chem 1 are allied health students with the goal of becoming nurses. With the current trend in health care, nurses continue to be in high demand. This gives the department the opportunity to serve a steady flow of students, the numbers of which will grow as word spreads about the current changes happening in the department. The growth will benefit the Chemistry department as well as other related departments, and it will give the Chemistry department the opportunity to enhance the collaborative efforts between the different science departments. As most of the faculty in the sciences teach the same cohorts of students, the professors have the ability to work together to make class content inclusive of the different disciplines, to enforce the emerging culture of the sciences not being individualized, but rather very intertwined. The professors also have the ability to work together to keep their shared students on the right path in their educational journey.

- B. Threats:** *Current trends and events occurring **outside** the department or program that could jeopardize its success represent potential threats. Examples may include: state, regional, or institutional economic/budget climate; loss of support services; seasonal fluctuations in workload.*

The change in requirements of the local nursing programs continues to be a threat, as stated above, due to the fact that Introductory Chemistry is no longer accepted for transfer to these institutions.

7. Continuing Education/Professional Development

- A. What continuing education and/or professional development activities have program/unit members attended during the current cycle?**

The full-time chemistry instructor has attended many workshops and conferences in the last year, including STEM Tech 2014 in Denver, CO, BSILI 2015 in Lake Arrowhead, CA, and a Reading Apprenticeship (RA) in STEM conference in Oakland, CA. An online RA course that was completed in the Spring of 2015, preceded the RA conference. The same instructor is scheduled to attend STEM Tech 2015 in Phoenix, AZ.

- B. How did this benefit your department and the College?**

The focus of STEM Tech is for faculty, counselors and administrators to come together for workshops and discussions in innovative ways of teaching STEM courses, as well as strategies for recruiting, retaining and transferring students in STEM fields. Many of the workshops focus on how faculty can increase the success of underrepresented students in STEM fields. This benefits the instructors by providing ideas on

how to motivate students from such diverse backgrounds, which in turn benefits the students by increasing their chances of completing their classes with better understanding and higher grades, which in turn benefits the college due to more students completing degrees or certificate programs and/or transferring to four-year institutions. The reading Apprenticeship program is based on the philosophy that students must become confident and active readers in order to be successful in school. Science text is particularly difficult to digest, and the workshops teach different methods to use with students to assist them in becoming more successful in understanding science text. This is beneficial to the college by training students to become active in their reading which is useful in all of their classes and helps with their success.

C. What are the plans for continuing education and/or professional development in the upcoming cycle?

The full time instructor is scheduled to attend STEM Tech 2015 in November 2015, and would like to make this conference an annual occurrence.

8. Prior Goals/Objectives

- Briefly summarize the progress your program has made in meeting the goals and objectives identified in the most recent Program Review or Annual Update. *(Include measurements of progress or assessment methods.)*
- If the program does not have prior goals and objectives, please explain.

The Department of Chemistry doesn't have prior goals and objectives specific to the department since this is the first program review written for the Chemistry Department alone. The previous goals for the Department of Natural Science and Math were to provide students a successful college learning experience and to foster and improve offerings in regard to innovative learning environment that respects diversity. The Department of Chemistry continues to provide students a successful college learning experience by providing quality instruction that emphasizes the relevance of chemistry in our lives, specifically in the health fields, as most of the students in the chemistry course offered are planning on pursuing careers in the allied health fields. Offerings have not been improved in the Department of Chemistry, as only the single class, Introductory Chemistry is currently offered. This remains a goal. The Department of Chemistry remains committed to fostering innovative learning environments that respect diversity through using active teaching in both the classroom and laboratory settings, which has been proven to increase understanding, engagement, and success.

9. Goals/Objectives/Actions (ACTION PLAN)

- GOALS:** Formulate Program Goals to maintain or enhance program strengths, or to address identified weaknesses.
- ALIGNMENT:** Indicate how each Goal is aligned with the College's Strategic Priorities.
- OBJECTIVES:** Define Objectives for reaching each Goal.
- ACTIONS/TASKS REQUIRED TO ACHIEVE OBJECTIVE:** Create a coherent set of specific steps (Actions/Tasks) that must be taken to achieve each Objective.
- OUTCOMES:** State intended Outcomes and list appropriate measures and assessment methods for each Outcome.
- ADDITIONAL INFORMATION:** This area provides for the additional communication of information necessary to further "close the loop" on the goal or action plan, as it relates to Institutional Planning. This may include references to other institutional documents, such as governing or compliance documents (i.e. Board Policy, Administrative Procedures, Title V), institutional planning documents (i.e. Strategic Plan, Educational Master Plan, Facilities Plan, Technology Plan), or Board, Presidential, Supervisory or Departmental recommendations or goals, etc. *(See Handbook for additional examples.)*

Complete the following table with your Program’s **ACTION PLAN**, which must include a **minimum of 3 goals**:

ACTION PLAN					
GOAL		ALIGNMENT WITH BCC STRATEGIC PRIORITIES	OBJECTIVE	ACTIONS/TASKS REQUIRED TO ACHIEVE OBJECTIVE	OUTCOMES, MEASURES, and ASSESSMENT
#1	Foster an innovative learning environment in the classroom and laboratory.	<i>Priority #1</i>	#1 To offer programs and services for students outside the classroom	Work closely with the tutoring center and examine the possibility of introducing an SI component to the class	Students will have more resources outside of the classroom. The success will be measurable by an increase in the percentage of students that succeed and/or remain enrolled in the course.
			#2		
			#3		
<i>Additional Information:</i>					
#2	Provide a successful college learning experience.	<i>Priority #2</i>	#1 To make current courses more widely transferable	Work with counselors at BCC and at other institutions to construct an acceptable COR for Introductory Chemistry	Chem 1 will be transferable and more students will be willing to take it at BCC. The success will be measurable by an increase in enrolment in the Chem 1 class as well as the number of students that transfer.
			#2 To offer a wider variety of chemistry classes	Research the demand for additional classes and create or unarchive additional chemistry classes.	Additional chemistry classes will be offered for students that are interested in focusing on hard sciences or STEM fields. The success will be measurable by the implementation of new courses by the college.
			#3		

ACTION PLAN						
GOAL		ALIGNMENT WITH BCC STRATEGIC PRIORITIES	OBJECTIVE	ACTIONS/TASKS REQUIRED TO ACHIEVE OBJECTIVE	OUTCOMES, MEASURES, and ASSESSMENT	
	<i>Additional Information:</i>					
#3	Promote and support student engagement.	<i>Priority #3</i>	#1	To maintain currency in teaching techniques and pedagogy	Attend workshops and conferences that focus on teaching techniques and pedagogy in the STEM fields.	Instructors will be current with the techniques and pedagogy used in teaching STEM classes. The success could be measured by maintaining sufficient retention and success rates.
			#2			
			#3			
	<i>Additional Information:</i>					

10. Resources Required

List all significant resources needed to achieve the objectives shown in the table above, including personnel, training, technology, information, equipment, supplies, and space. Every request for additional resources must support at least one objective.

Also list any resources required to implement planned improvements noted in 3.C.3)

IMPORTANT: A BUDGET ALLOCATION PROPOSAL must be completed and submitted for **EACH** new resource requested.

Goal #	Objective #	Resource Required	Estimated Cost	BAP Required? Yes or No	If No, indicate funding source

Annual Update #1

Academic Year: 2015-16

1. Progress on Program Level Outcomes (PLOs) and Student Learning Outcomes (SLOs) (from #3B of full PR)

A) List your Program Level Outcomes:

1. Demonstrate knowledge of natural phenomena and recognize the processes that explain them.
2. Demonstrate knowledge of scientific methodologies when solving a problem.
3. Apply formal systems of reasoning, critical thinking, and mathematical methods in solving or analyzing problems.

B) Summarize the progress you have made on Program Level Outcomes (PLOs):

The first step made on the Program Level Outcomes was to change them upon recommendations by PLO reviewers. It was suggested that the PLOs needed to be more specific to a chemistry program rather than to the Natural Science and Mathematics program of which chemistry is a part. That being stated, the PLOs from this point forward, are as follows:

1. Students in the Chemistry Program should demonstrate level appropriate knowledge of chemical principles and processes.
2. Students in the Chemistry Program should demonstrate the ability to apply critical thinking to solve chemical problems.
3. Students in the Chemistry Program should demonstrate competency in the laboratory.

Although it is not a specific program level outcome, increased student enrolment is definitely progress for any program. Over the past year, the chemistry class has seen an increase in enrolment going from a fill rate of 76.3% in the fall of 2015 to 93.9% in the spring of 2016. These values differ a small amount from the data collected by the college due to the fact that one of the eight classes that was used in the data analysis stated that 23 of 30 seats were filled, when only 24-25 seats can be filled due to safety reasons. The fall data was re-worked to account for the appropriate maximum for the one class that it affected. The completion rate for the chemistry class was 91.02%, which is a high completion rate for a class as challenging as chemistry. The success rate was 75.45%, which is an increase since the previous year, and a completely acceptable rate for such a challenging class. The completion rate was higher than the success rate which would indicate students that were doing poorly in the class didn't drop. This may be due to students being constrained by financial aid requirements, and other unit requirements that don't allow students to drop below a certain unit threshold. It could also indicate that students didn't pass as a result of the final exam. Although this is possible, it is not probable, as the points are divided fairly between multiple assignments, of which the final exam is only one. If a student failed because of the final exam, the student had to have been doing poorly leading into the final exam. Regardless of the reasoning, the numbers meet or exceed expectations for this particular field of study.

The Program Level Outcomes that were stated above are the PLOs that would be implemented if a chemistry program existed. At this point, there is no chemistry program – there is one class that is offered in chemistry. Beginning Fall of 2017, two more classes will be in the catalog, which will be a good beginning to a program. As the program begins to form, these PLOs will be reexamined to ensure that they encompass all classes in the program appropriately.

C) Summarize the progress you have made on course level outcomes and assessments (SLOs):

The SLOs for the Chem 1 course have been changed since the last year, as suggested by the SLOAC committee. They are now as follows:

1. Students will be able to demonstrate knowledge of general principles of atomic and molecular structure, chemical reactivity, stoichiometry, and chemical calculations.
2. Students will be able to safely execute basic chemical experiments involving performing accurate quantitative measurements, interpret experimental results, perform calculations on these results and draw reasonable and accurate conclusions from the data, all while demonstrating knowledge of proper standard laboratory safety rules, appropriate chemical handling, and emergency procedures. Since safety is paramount, it is expected that all students will score 80% or better on the safety quiz.
3. Student will be able to demonstrate competency in communicating science through writing and computer technology by gathering, displaying and analyzing chemical information, and formulating complete and legible laboratory reports.

These changes were implemented to make the desired outcomes clearer and less convoluted and to make the measurement of the objectives more specific. The changes also bring the Chem 1 SLOs more in line with the SLOs of other science departments at Barstow Community College. These changes will be used to assess progress beginning the Fall of 2016.

The previous SLOs that were used to assess progress over the last year are as follows:

1. Provide students with accurate and relevant chemical information
 - a. Students will be able to demonstrate knowledge of general principles of atomic and molecular structure, chemical reactivity, stoichiometry, and chemical calculations.
2. Provide students with an introduction to standard laboratory methods and an ability to execute basic chemical experiments
 - a. Students will be capable of performing accurate quantitative measurements, interpreting experimental results, performing calculations on these results, and drawing reasonable and accurate conclusions from data.
 - b. Students will be able to anticipate, recognize and respond properly to hazards of chemical handling. Students will know locations and uses of personal protective equipment; understand standard laboratory safety rules, standard emergency procedures, and Material Safety Data Sheets.
3. Provide students with the opportunities to practice effective scientific computer and written communication skills.
 - a. Students will be competent in using computer technology to learn, gather, display, and analyze experimental data.
 - b. Students will demonstrate effective written scientific communication skills. Students will complete legible laboratory reports.

The first SLO is assessed using test and quiz questions. Four test questions were given that yielded an average of 60% correct. One quiz yielded 89.4% of the students passing with a grade of 70% or higher, and the other quiz yielded 70% of the students passing with a grade of 70% or higher.

The second SLO is assessed using laboratory reports and a safety quiz. Since the students generally get full or nearly full credit for their lab reports, this assessment yields very high results; over the past year assessment of the specific laboratory reports yielded average scores of over 90% across all sections. The safety quiz yielded an average score of 95%, with no student scoring below an 80%. These scores exceed expectations, as the SLO specifically states that each student is expected to score 80% or higher on this quiz.

The third SLO is assessed with a specific laboratory report and a writing assignment. The average scores on the laboratory report ranged from 91.5% to 100% for all sections. The writing assignment yielded an average of 74% which is reasonable, considering the difficulty of expressing scientific thought in writing without the guidance of a laboratory procedure.

The use of multiple assessment methods, in addition to the multi-tiered format that the SLOs were written in, made the analysis of the assessment data rather complicated. It was suggested that the SLOs be rewritten, which they were, and it was suggested that only one method of evaluation be used per SLO, which is a suggestion that will be followed in the next SLO submission.

D) Describe any program, course, and/or instructional changes made by your program as a result of the outcomes assessment process.

Program changes include introducing more chemistry classes, which is the first step in allowing chemistry to become an actual department. Course changes were made in order to make the Chem 1 class transferable. Neither of these changes were initiated by results of the outcomes assessment process, rather they were made out of general necessity. The assessment process was convoluted due to the SLOs being multi-tiered, which led to the change in SLOs. The assessment of the new SLOs should be less convoluted and more straight forward in the future. One change will be that only one type of assessment will be used per SLO. The overall statistical outcomes of the Chem 1 class are pleasing. There are more students enrolling, not dropping, and succeeding than in the previous year, and the SLO data shows that students are meeting or exceeding these expected outcomes. There have been no instructional changes made since over the last year, but a new adjunct faculty that is qualified to teach both physics and chemistry may begin teaching here in the spring.

E) Reflecting on the responses for B) and C) above, what will you implement for the next assessment cycle?

. There will be no change at the program level over the next assessment period, as the new classes will not be offered until 2017, but they will be part of the following cycle, at which time there may be program level changes, as there may be enough classes to constitute the beginnings of a program. The next assessment cycle will use the new SLOs to make data between all sections more comparable. Instruction will not change appreciably, as the instruction over the last cycle has been successful as seen by the increase in enrolment from the fall to the spring, and an increase in success and retention for the Chem 1 students.

2. GOALS AND OBJECTIVES (Taken From #9--Action Plan--of FULL Program Review)

GOAL		OBJECTIVE		ACTIONS/TASKS REQUIRED TO ACHIEVE OBJECTIVE	OUTCOMES, MEASURES, and ASSESSMENT
#1	Foster an innovative learning environment in the classroom and laboratory.	#1	To offer programs and services for students outside the classroom	Work closely with the tutoring center and examine the possibility of introducing an SI component to the class	Students will have more resources outside of the classroom. The success will be measurable by an increase in the percentage of students that succeed and/or remain enrolled in the course.
		#2			
		#3			

Goal #1 Annual Update: (Assess progress made toward goal attainment)

The desire to implement an SI program for chemistry remains strong as it is shown to be a valuable tool in so many other colleges. The extent of the progress made regarding SI has been primarily discussion with other faculty to gauge interest and to discuss a plan on how to get this ball rolling. Although the ball is not rolling as of yet, an NSF grant through Cal State San Bernardino has recently been awarded that includes money for SI leaders. Regarding the tutoring center, former students that were successful in the Chem 1 class have been working in the tutoring center, offering more availability to the current students. This may have been helpful in increasing the success rate in Chem 1. Both SI implementation and strengthening the chemistry component of the tutoring center remain a goal.

GOAL		OBJECTIVE		ACTIONS/TASKS REQUIRED TO ACHIEVE OBJECTIVE	OUTCOMES, MEASURES, and ASSESSMENT
#2	Provide a successful college learning experience.	#1	To make current courses more widely transferable	Work with counselors at BCC and at other institutions to construct an acceptable COR for Introductory Chemistry	Chem 1 will be transferable and more students will be willing to take it at BCC. The success will be measurable by an increase in enrolment in the Chem 1 class as well as the number of students that transfer.
		#2	To offer a wider variety of chemistry classes	Research the demand for additional classes and create or unarchive additional chemistry classes.	Additional chemistry classes will be offered for students that are interested in focusing on hard sciences or STEM fields. The success will be measurable by the implementation of new courses by the college.
		#3			

Goal #2 Annual Update: (Assess progress made toward goal attainment)

The Chem 1 class has been re-written to be accepted as a transfer class to one of the local nursing programs that is a very popular program with the students at BCC, which was the primary objective for this class. More research and work need to be done to make sure it is transferable to a wider range of programs outside of the high desert area, and the introduction of another course is being explored as a viable option to broaden transfer possibilities. Additional chemistry classes will be offered beginning Fall 2017. The general chemistry series for science majors will be made available with the first class in the series being taught in the fall and the second in the spring. Enrolment will be a factor in deciding when to implement an organic chemistry class for majors, as general chemistry is a prerequisite for organic chemistry. A substantial chemistry student base will need to be built up in order to necessitate a class of this level. Of course, as more classes are offered, more faculty will need to be hired to teach them.

GOAL		OBJECTIVE		ACTIONS/TASKS REQUIRED TO ACHIEVE OBJECTIVE	OUTCOMES, MEASURES, and ASSESSMENT
#3	Promote and support student engagement.	#1	To maintain currency in teaching techniques and pedagogy	Attend workshops and conferences that focus on teaching techniques and pedagogy in the STEM fields.	Instructors will be current with the techniques and pedagogy used in teaching STEM classes. The success could be measured by maintaining sufficient retention and success rates.
		#2			

GOAL		OBJECTIVE	ACTIONS/TASKS REQUIRED TO ACHIEVE OBJECTIVE	OUTCOMES, MEASURES, and ASSESSMENT
		#3		

Goal #3 Annual Update: (Assess progress made toward goal attainment)

The full time professor took advantage of the opportunity to attend a 4 day STEM conference in Arizona, aimed primarily at community college teaching. Different techniques discussed in workshops have been explored and some have begun being implemented in the classroom. Whether this leads to higher retention and success rates remains to be seen, as there are multiple variables that need to be factored in to the recent data: the first of which is a new professor teaching the course; another is changes in text book and curriculum. Over a longer period of time, provided subject appropriate conferences are still made available to the professors, this should ultimately lead to higher success and retention rates. The success and completion rates have increased over the past year, however, which is surely a result of many factors, one of which may very well be the use of new techniques by the professor in the classroom, techniques that were learned at the conference.

3. Resources Required

List all significant resources needed to achieve the objectives shown in your action plan, including personnel, training, technology, information, equipment, supplies, and space. Every request for additional resources must support at least one objective.

Also list any resources required to implement planned improvements noted in 3.C.3)

IMPORTANT: A BUDGET ALLOCATION PROPOSAL must be completed and submitted for **EACH** new resource requested.

Goal #	Objective #	Resource Required	Estimated Cost	BAP Required? Yes or No	If No, indicate funding source

Annual Update #2

Academic Year: 2016-2017

1. Progress on Program Level Outcomes (PLOs) and Student Learning Outcomes (SLOs)**(from #3B of full PR)****A) List your Program Level Outcomes:**

1. Students in the Chemistry Program should demonstrate level appropriate knowledge of chemical principles and processes.
2. Students in the Chemistry Program should demonstrate the ability to apply critical thinking to solve chemical problems.
3. Students in the Chemistry Program should demonstrate competency in the laboratory.

B) Summarize the progress you have made on Program Level Outcomes (PLOs):

These Program Level Outcomes are new as of last year. They were changed after recommendation by the PLO reviewers to make them more fitting to a chemistry specific program in anticipation of more chemistry classes being added. During the 2016-2017 school year, only one course was being offered, so the program level outcomes only represent the information from a single course, Introductory Chemistry. The first and the second PLO requires that students have appropriate knowledge of the subject in both a conceptual as well as a quantitative way. The last PLO requires that the students also learn how to work in a laboratory. They must conduct experiments, gather and analyze the data and present it in a comprehensive report. All three of the PLOs must be met in order for students to succeed in the current chemistry course. The exams and quizzes include conceptual material as well as quantitative material, and because CHEM 1 is a lab based class, students must pass both the lecture portion of the course as well as the laboratory portion of the course in order to earn a passing grade.

Progress made in the Program Level Outcomes for the chemistry "program" is demonstrated by the success and completion rate of the chemistry classes for the CHEM 1 course. The completion rate for the 16-17 school year was 87.68% and the success rate was 71.43%. Both of these numbers are a few percentage points lower than they were for the previous school year, but are still completely acceptable numbers for a program as challenging as chemistry is. In researching general completion rates and success rates in other colleges, a 20-point separation was usual, whereas the separation in the chemistry program completion vs success rate is only around 16 points. The fill rate fell a few percentage points but not due to lack of enrolled students, but rather an oversight in the scheduling of the classes. This particular chemistry course, since it is a laboratory based class, cannot safely have more than 24 students in it, however, last year at least one of the sections was inadvertently capped at a significantly higher number. In order to accommodate the extra students, an extra section was added on a Friday and students that wanted to add were encouraged to move to that section, as well as students that felt that the Friday class suited their schedules better. Enough students moved or dropped within the first two weeks that the original classes were left with a safe number of students, however, the Friday class didn't fill because it wasn't even offered until well into the second week of instruction. If that class were subtracted from the data, the data would show a higher percentage for the fill rate than 85.06%. However, 85% is a very decent fill rate for the college.

Because chemistry is still a single course and not a program, the numbers stated above only speak to the one particular course but are valid in assessing progress in the outcomes. Progress toward the stated outcomes is holding steady with very acceptable numbers for the completion, success and fill rates.

C) Summarize the progress you have made on course level outcomes and assessments (SLOs):

The Student Learning Outcomes for the currently offered chemistry course are as follows:

1. Students will be able to demonstrate knowledge of general principles of atomic and molecular structure, chemical reactivity, stoichiometry, and chemical calculations.
2. Students will be able to safely execute basic chemical experiments involving performing accurate quantitative measurements, interpret experimental results, perform calculations on these results and draw reasonable and accurate conclusions from the data, all while demonstrating knowledge of proper standard laboratory safety rules, appropriate chemical handling, and emergency procedures. Since safety is paramount, it is expected that all students will score 80% or better on the safety quiz.
3. Students will be able to demonstrate competency in communicating science through writing and computer technology by gathering, displaying and analyzing chemical information, and formulating complete and legible laboratory reports.

Over the last school year, 111 out of 131 students took the stoichiometry quiz that is given to assess SLO #1. Of these students, 80 of them got 100% on the quiz. An acceptable score on this quiz is 10 points. 83% of the students were successful in obtaining scores of 10 points or higher. 17% of the students did not earn an acceptable score on this quiz. As for SLO #2, 131/133 students took the safety quiz and 101 of them scored 100% on it. 80% is seen as an acceptable score for this quiz and only 2 students didn't earn an acceptable score, making a 98.5% success rate on this particular SLO. The last SLO was assessed for 119 out of 133 students, 110 of whom earned a perfect score. An acceptable score for this particular SLO is expected to be 100% since it is based on a lab report that the students have time to complete correctly. The students that didn't earn 100% lost points for a variety of reasons such as not following directions, leaving early, and not using the computer to label graphs and doing it by hand as well. Over 92% of the students earned an acceptable score for this particular SLO. These results indicate that students are progressing well in the Introductory Chemistry class and are well prepared for the classes they take for which Chem 1 was a prerequisite.

Changing the SLO's to three single stand-alone learning objectives has made this process much more straight forward and has made it easier to line up the SLOs for this particular course with the PLOs for the program as a whole. Once there are more chemistry classes offered, this system will make it easier to compare the SLOs of all of the courses offered and tie them together to show how they support the PLOs.

D) Describe any program, course, and/or instructional changes made by your program as a result of the outcomes assessment process.

One change that was implemented was the addition of online homework for all sections of the CHEM 1 course. This brings some continuity to the classes offered by the two different professors. The first General Chemistry class has been added to the program and will be offered for the first time in the Fall of 2018. It was anticipated to be rolled out for Fall of 2017, but wasn't added to the schedule. General Chemistry is a yearlong class consisting of two consecutive semesters. The first semester will be offered in the fall and the second will be offered in the Spring. Another change to the program will be the addition of another chemistry class. The first change I made to the program was to make the Introductory Chemistry class (CHEM 1) transferable to the local nursing program at APU. The requested changes were

made and an informal approval was given by the APU counselors. With CHEM 1 accepted for transfer at APU, the General Chemistry classes were next on the to-do list. After writing the first General Chemistry class, the APU counselors decided that the changes made to the Introductory Chemistry class were not acceptable after all. In order to be acceptable for transfer to the nursing program at APU, the course needs to include significantly more organic chemistry and biochemistry. I had already committed to the General Chemistry sequence, so it took priority over the Introductory Chemistry class. Once General Chemistry is completely finished and ready to be offered in the Spring of 2018, the changes necessary for the Introductory Chemistry class will be reexamined. The plan at the moment is to add an additional class rather than pack more into the class currently being offered, due to extremely limited success rates in the identical class that is offered as a one semester class at Victor Valley College. I feel that the students at Barstow Community College will be significantly more successful in the Introductory course if it is offered as a two class sequence rather than having all of the same information packed into one semester.

E) Reflecting on the responses for B) and C) above, what will you implement for the next assessment cycle?

I feel that the current course, which is the only course in the Chemistry Program that was taught during the 2016-2017 year, is being taught well and is serving the needs of the students. I don't see a need for much change at this point in the program. Based on success rates, completion rates, and fill rates (with the exception of the one section that wasn't opened until a few weeks into the semester) it seems that this particular course is doing just fine. Once the General Chemistry class begins being offered, there will be significant challenges brought about by offering this sequence.

2. GOALS AND OBJECTIVES (Taken From #9--Action Plan--of FULL Program Review)

GOAL		OBJECTIVE	ACTIONS/TASKS REQUIRED TO ACHIEVE OBJECTIVE	OUTCOMES, MEASURES, and ASSESSMENT
#1	Foster an innovative learning environment in the classroom and laboratory.	#1		Students will have more resources outside of the classroom. The success will be measurable by an increase in the percentage of students that succeed and/or remain enrolled in the course.
		#2		
		#3		

Goal #1 Annual Update: (Assess progress made toward goal attainment)

I have identified other science professors that plan to utilize SI in their classes and who have training in SI. In addition, I have been in recent contact with an administrator who is also interested in implementing an SI program at BCC and that has agreed to work closely with me. The funds from the grant mentioned in the previous update are to be released to BCC shortly, and a portion are earmarked to pay SI leaders. The ball is finally beginning to roll on implementing an SI program. I have sent a number of former students to the tutoring center to become tutors, and a few of them have been hired. This is tremendously helpful because I can recommend different tutors for my students based on personality type and need. I know the majority of the tutors that work in the tutoring center now and am confident in their skills and ability to help my current students.

GOAL		OBJECTIVE		ACTIONS/TASKS REQUIRED TO ACHIEVE OBJECTIVE	OUTCOMES, MEASURES, and ASSESSMENT
#2	Provide a successful college learning experience.	#1	To make current courses more widely transferable		Chem 1 will be transferable and more students will be willing to take it at BCC. The success will be measurable by an increase in enrolment in the Chem 1 class as well as the number of students that transfer.
		#2	To offer a wider variety of chemistry classes	Research the demand for additional classes and create or unarchive additional chemistry classes.	Additional chemistry classes will be offered for students that are interested in focusing on hard sciences or STEM fields. The success will be measurable by the implementation of new courses by the college.
		#3			

Goal #2 Annual Update: (Assess progress made toward goal attainment)

The general chemistry course was the primary focus of the department after the Introductory chemistry course was made acceptable for transfer to the local nursing program at APU. After the first semester of the General Chemistry class was written and accepted by the BCC curriculum committee, the original acceptance of the changes of the Introductory Chemistry class was taken back as the APU nursing program felt that the course needed to include more Organic and Biochemistry. Since the General Chemistry course is set to be offered in the Fall of 2018 (it was originally to be offered in the Fall of 2017 but strangely didn't make it into the schedule) both semesters needed to be completed and ready. Once the second semester is completely finished and accepted by the BCC curriculum committee, the additional changes needed for the Introductory Chemistry class to be acceptable for transfer to APU will be made. The changes will be in the form of an additional semester of Introductory Chemistry that will comprise only Organic and Biochemistry. Students that take the class as a two-semester series are significantly more successful than students that are forced to take the class as a single semester class with the introductory level general chemistry, organic chemistry and biochemistry all packed into one course.

GOAL		OBJECTIVE		ACTIONS/TASKS REQUIRED TO ACHIEVE OBJECTIVE	OUTCOMES, MEASURES, and ASSESSMENT
#3	Promote and support student engagement.	#1	To maintain currency in teaching techniques and pedagogy	Attend workshops and conferences that focus on teaching techniques and pedagogy in the STEM fields.	Instructors will be current with the techniques and pedagogy used in teaching STEM classes. The success could be measured by maintaining sufficient retention and success rates.
		#2			
		#3			

Goal #3 Annual Update: (Assess progress made toward goal attainment)

The chemistry professors promote and support student engagement as a part of their profession, however, despite being given permission to go to the STEM conference again, the permission was rescinded when it was discovered that there was not enough money in the budget. This was unfortunate because this particular conference is specific to teaching STEM classes at the community college level. Without sufficient money to send professors to conferences, the professors read journal articles and other online content as a primary mode of maintaining currency in teaching techniques and pedagogy. A BAP will be submitted with the next full program review asking specifically for money for conferences. More grants will be researched as well that include money for conference attendance.

3. Resources Required

List all significant resources needed to achieve the objectives shown in your action plan, including personnel, training, technology, information, equipment, supplies, and space. Every request for additional resources must support at least one objective.

Also list any resources required to implement planned improvements noted in 3.C.3)

IMPORTANT: A BUDGET ALLOCATION PROPOSAL must be completed and submitted for **EACH** new resource requested.

Goal #	Objective #	Resource Required	Estimated Cost	BAP Required? Yes or No	If No, indicate funding source