

# Bakersfield College 2018-2019 Program Review – Annual Update

Program Name: **Chemistry**

**Bakersfield College Mission:**

Bakersfield College provides opportunities for students from diverse economic, cultural, and educational backgrounds to attain Associate and Baccalaureate degrees and certificates, workplace skills, and preparation for transfer. Our rigorous and supportive learning environment fosters students' abilities to think critically, communicate effectively, and demonstrate competencies and skills in order to engage productively in their communities and the world

**Describe how the program supports the Bakersfield College Mission:**

The chemistry program offers a complete two-year sequence of courses required for the career pathways of a wide variety of students. The core classes (CHEM B1a/b, B30a/b, and B11) are prerequisites for the various STEM programs (e.g. physical and biological sciences, engineering, and allied health sciences). All transfer to four-year institutions. Additionally, CHEM B2A serves as a preparatory course for STEM majors and as a requirement for the BC industrial automation baccalaureate degree. Physical Science B12 serves as a general education requirement for liberal studies, education, and some agriculture degrees.

The chemistry AS-T degree has been approved at the state level. We are experiencing a significant increase in the number of degree recipients and transfers to programs to the UC's, CSU's, and other 4-year institutions to pursue STEM degrees.

Overall, a very large number of students pass through our labs as part of their journey at BC. Just within the declared STEM major crowd we are working with about 1,500 students who need our courses--this does not include declared allied health majors or liberal arts/general education. Our methods involve multiple pedagogical approaches to learning styles with the goal of building students' critical thinking skills. Coursework involves a large amount of scientific writing, applied mathematics, research-styled laboratory engagement, group work, and exposure to modern research environments.

Thus, the department is highly focused on student success and directly support the core values of the college. Our work in the STEM area is strongly tied to BC's current student success initiatives.

***Instructional Programs only:***

- A. List the degrees and Certificates of Achievement the program offers
  - *Associate of Science for Transfer (AS-T) in Chemistry*
  - *Associate of Science in Chemistry*
  
- B. If your program offers both an A.A. and an A.S. degree in the same subject, please explain the rationale for offering both and the difference between the two.

- C. If your program offers a local degree in addition to the ADT degree, please explain the rationale for offering both.

*There are groups of students heading into programs which do not require the more rigorous approach of the AS-T degree. Consequently we offer the A.S. degree, which is the best set of classes we see being needed by that group of students. The work required for the degree is still substantial and covers the chemical grounds found in the AS-T.*

**Program Goals:**

- A. List the program's current goals. For each goal (minimum of 2 goals), discuss progress and changes. If the program is addressing more than two (2) goals, please duplicate this section. Please provide an action plan for each goal that gives the steps to completing the goal and the timeline.

**1. Program Goal:** Discipline promotion

**List the institutional goals from the Bakersfield College Strategic Plan that will be advanced upon completion of this goal?**

(Student Learning, Student Progression and Completion, Facilities, Leadership and Engagement)

**1, 2**

**Progress on goal achievement:**

**Ongoing as of September 2018**

**Status Update – Action Plan and any link to Resource Requests:**

An **ACS club** is ongoing, with activities both inside and outside of BC. The physical science webpage is being enhanced to clarify academic and career pathways and choices.

Faculty members are actively involved in advising STEM majors as part of the Pathways initiative.

**2. Program Goal:** Improve professional development through training in areas specific to STEM and pedagogy.

**List the institutional goals from the Bakersfield College Strategic Plan that will be advanced upon completion of this goal?**

(1. Student Learning, 2. Student Progression and Completion, 3. Facilities, 4. Leadership and Engagement)

**1, 2, 3**

**Progress on goal achievement:**

**Ongoing as of September 2018**

**Status Update – Action Plan and link to Resource Requests**

A majority of the chemists attended the 2018 Biennial Conference on Chemical Education. Participants fully agree to its benefits to **helping/stimulating thoughts about classroom structure/pedagogy**. Several FLEX activities will come from this work, extending what was learned to the wider STEM faculty community and beyond.

3. **Program Goal:** Generate new course(s) which will help attract GE-seeking students into the STEM area, and finalize our offerings for transfer degrees.

**List the institutional goals from the Bakersfield College Strategic Plan that will be advanced upon completion of this goal?**

( 1 Student Learning, 2. Student Progression and Completion, 3. Facilities, 4. Leadership and Engagement)

**1, 2, 3**

**Progress on goal achievement:**

Ongoing as of September 2018

**Status Update – Action Plan and link to Resource Requests**

We've developed a new CHEM B10 course geared specifically at the GE community of students.

- B. List new or revised goals (if applicable)

**Program Goal: New certificate program for laboratory technicians**

**List the institutional goals from the Bakersfield College Strategic Plan that will be advanced upon completion of this goal?**

(Student Learning, Student Progression and Completion, Facilities, Leadership and Engagement)

**1, 2, 3**

**Progress on goal achievement:**

New for 2018-2019

**Status Update – Action Plan and link to Resource Requests:**

Currently at the discussion stage of program formulation

**Program Goal: Revise the classes required for the AS degree**

A few of the requirements are outdated and should be removed or changed.

**List the institutional goals from the Bakersfield College Strategic Plan that will be advanced upon completion of this goal?**

(Student Learning, Student Progression and Completion, Facilities, Leadership and Engagement)

**1, 2**

**Progress on goal achievement:**

New for 2018-2019

**Status Update – Action Plan and link to Resource Requests:**

Currently under discussion

**Program Analysis:**

Take a look at your trend data (all programs should have some form of data that is used to look at changes over time).

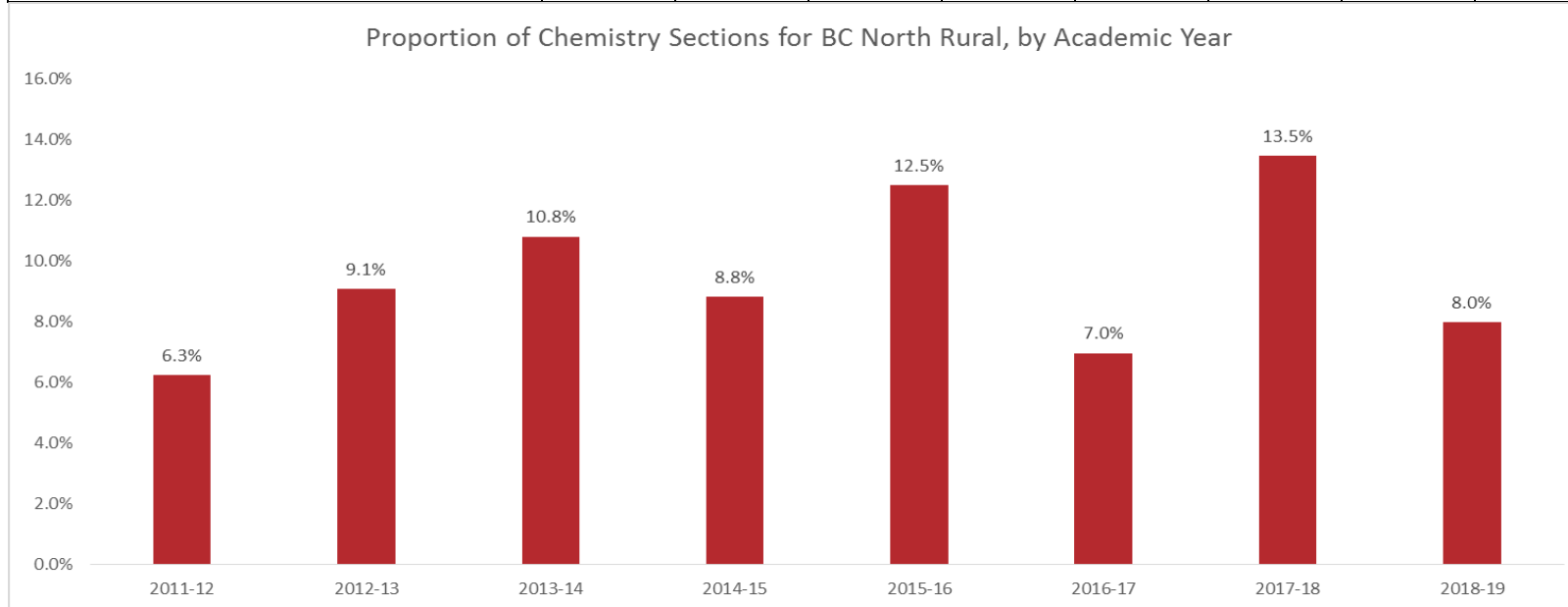
Please report on any unexpected changes or challenges that your program encountered this cycle:

- We are consistently running through all our funding (laboratory, equipment, chemical, and office). More support is needed for program growth.
- A continuing challenge is the management of course sections affected by professors taking off a semester (or other time frame) for various reasons. Our adjunct pool is prohibitively small; their loads prevent the adjuncts from contributing more than one section of most classes (e.g. 2 out of 22 sections of chemistry this semester alone).

1. How does your trend data (or other data your area collects) impact your decision making process for your program?

The ability for the Physical Science department to offer chemistry courses has increased over the past 4 years as four new fulltime faculty have been hired over this timeframe. This has translated into the addition of chemistry sections in the BC North Rural area as is apparent from the trend table below, where 2017-18 had 7 sections supported versus 2 sections in 2011-12.

BC North Rural	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19
Proportion of Chemistry Sections	6.3%	9.1%	10.8%	8.8%	12.5%	7.0%	13.5%	8.0%
Number of Chemistry Sections	2	3	4	3	5	3	7	2



Currently, the limitations of section and enrollment growth in rural areas is limited by two factors, laboratory availability and faculty availability. Thus, it is critical that both of these be addressed at BC Southwest, Arvin and other locations, so the College can better serve students interested in STEM and Health degrees (including Nursing).

2. Evidence of Department Dialog of data

- If you have had time to review and discuss your program's data with members of your department, attach documentation of your discussion. Documentation can come in the form of minutes from meetings or retreats, email dialog or any other ways that show substantive discussion.

This is something that has been done on an informal basis up to now. Understanding now that the process needs to be more formalized will have such in place starting this year.

3. Were there any changes to student demographics (age, gender, or ethnicity) for the past cycle?

None are apparent. There are only slight fluctuations in this on a yearly basis.

4. Were there any changes to student success and retention rates for face-to-face and online courses? (instructional only)  
NA

5. Equity gaps

- Please look for large differences, or gaps, between top performing groups and others. Consider how you could identify the reasons behind these gaps, and if there changes that could be made to reduce them. For in depth review of equity issues, and on changes that are being made campus-wide, please refer to the current [Bakersfield College Student Equity Plan](#).

Our numbers mirror those of the campus as a whole. The one substantive difference is a slightly higher (60% vs. 55%) success rate for African Americans in our program. We hesitate to use strong bravos, however.

There are many reasons why different groups perform unequally. One of the best ways for us to hopefully influence the performance is through an increased focus on students' learning habits—teaching them how to learn. This is a newer focus within the department driven by our continuing education efforts (the BCCE) and is unbiased in any fashion other than to help those less prepared to study rigorous material to come up to the level of those who are better prepared.

6. Please describe any recent achievements of your department, including but not limited to faculty who have won awards or distinctions, new projects your department has implemented, professional development work, professional conference presentations or recently published work.

Aside from attending the Biennial Conference on Chemical Education (BCCE) in August 2018, four presentations were made at that conference regarding the work we have been doing in our classrooms. These will lead to FLEX activities on campus to disseminate the work.

One of our professors has just had major work published in his field of research:

Traynor, N. B. J.; McLauchlin, C.; Dodge, K.; McGarrah, J. E.; Padalino, S. J.; McCluskey, M.; Sangster, T. C.; McLean, J. G. CR-39 (PADC) Reflection and Transmission of Light in the Ultraviolet–Near-Infrared (UV–NIR) Range. *Appl. Spectrosc.* **2018**, 72, 591-597.

Several other FLEX activities have been presented by the group.

Several faculty members are actively working to implement substantial changes in presentation and lab protocols to seriously enhance the learning environment. These changes mirror approaches being implemented nationwide at some excellent teaching institutions. The BCCE is one place where these ideas were disseminated/gathered.

7. The college has embarked on significant efforts such as **Guided Pathways**, **affinity groups** and **completion coaching communities** to improve the success and completion rates of our students. Please describe what your program/department/office is doing to contribute to these efforts.

Several of us are involved directly with the Pathways Completion committee, and all have been involved with their classes in promoting awareness of those goals. One has participated in the BC-CSUB research opportunity program over the summer. Several have volunteered for Summer Bridge work. Every year we have a Chemistry-based activity (Chemistry Rocks, this last year, and ACS Chemistry Week every year) to get students more involved in this STEM area.

8. Explain your role if you are involved in Dual Enrollment, Inmate Education, or Rural Initiatives.

We are not yet involved in these activities, partly due to facilities but also because we have no one able to participate. We are short-staffed.

#### **Analysis of Received Resources from Previous Cycle**

**Discuss the type of resources you received and their impact on program effectiveness?**

##### **Facilities:**

Facilities are still a limitation, but this should be addressed by the planned new SE building. The Bat Cave (MS-27) now has a white board, but things are still as cramped as ever.

##### **Technology:**

We have been fortunate to obtain more Vernier LabQuests and specific modules which have allowed the introduction of experiments heretofore unavailable to the labs.

##### **Other Equipment**

NA

#### **Conclusion:**

Our program has shown enormous growth over the past decade or so with huge leaps in laboratory improvements, the expansion of our group to nine professors, and changes in pedagogy as our faculty study and incorporate ideas into their courses based on self-driven interest and outside exposure to the larger world of chemical education via events like the BCCE. We have an excellent AS-T degree in place which serves an important role in our students transferring to other institutions, notably the UC's and private and/out-of-state universities. (Its value with the CSU system, like other community colleges, is unfortunately limited.) Our degree has evolved into a complete and robust program at BC for people seeking a career in chemistry and other STEM areas.

Of course, we aren't the only program to expand. Every other STEM area has done the same, and other aspects come into play such as an expanding rural initiative and an urgent focus on other ways to help the school benefit from the new state funding formula (perhaps a new Laboratory Certificate program?). Naturally we have classes which can work in rural areas (chem B10, B11, and B2a), but all these ideas taken together have created a vacuum we cannot work in—we do not have enough faculty, all over again. Support in Delano is on and off. Additionally, we will suffer the loss of one faculty member soon to retirement.

Having someone take off a semester has proven how fragile our structure is to outside pressures; we cannot offer classes that are known to fill easily; instead we're having to chop off sections. So... once again it has become imperative for us to ask for more help. We want to help our students get through in as few years as is reasonable for them, not us. We want to contribute to the goals we share with the school at large, but we are already at our limit and cannot do more without sacrificing what we currently offer the STEM pipeline.