# Bakersfield College
# Program Review – Annual Update

Program Name: **Chemistry**, of course!

Program Type: ☒ Instructional ☐ Student Affairs ☐ Administrative Service ☐ Other

***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.

**Program Mission Statement:**

The primary mission of the chemistry program is to provide the rigorous science foundation necessary for students to acquire the skills, knowledge, intellectual curiosity and scientific literacy essential for a wide variety of careers in this rapidly changing world. The department primarily offers transfer-applicable courses designed to satisfy the needs of science, engineering, premed, architecture, and allied health majors, college general education requirements, and liberal studies teacher credential programs. Community outreach efforts comprise a smaller, yet still important, part of the work we do.

***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 rigorous approach of the AS-T degree. Consequently we offer the less rigorous 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.*

**Progress on 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.

| Program Goal | Which institutional goals from the Bakersfield College Strategic Plan will be advanced upon completion of this goal? (select all that apply) | Progress on goal achievement (choose one) | Status Update – Action Plan |
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| 1. Discipline promotion | ☒ 1: Student Learning<br>☒ 2: Student Progression and Completion<br>☐ 3: Facilities<br>☐ 4: Oversight and Accountability<br>☐ 5: Leadership and Engagement | ☐ Completed: _____ (Date)<br>☐ Revised: _____ (Date)<br>☒ Ongoing: 09/2018 | 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.<br>Faculty members are actively involved in advising. |
| 2. Improve professional development through training in areas specific to STEM and pedagogy. | ☒ 1: Student Learning<br>☐ 2: Student Progression and Completion<br>☐ 3: Facilities<br>☒ 4: Oversight and Accountability<br>☐ 5: Leadership and Engagement | ☐ Completed: _____ (Date)<br>☐ Revised: _____ (Date)<br>☒ Ongoing: 09/2018 | All chemists plan to attend the 2018 Biennial Conference on Chemical Education.<br>Participants fully agree to its benefits to **helping/stimulating thoughts about classroom structure/pedagogy**. |
| 3. Generate new course(s) which will help attract GE-seeking students | 1: Student Learning<br>2: Student Progression and Completion<br>3: Facilities<br>4: Oversight and Accountability<br>5: Leadership and Engagement | ☐ Completed: _____ (Date)<br>☐ Revised: _____ (Date)<br>☒ Ongoing: 09/2018 | Our AS-T degree has been finalized!<br><br>Potential new courses are in active discussion. |

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| into the STEM area, and finalize our offerings for transfer degrees. | | | |

B. List new or revised goals (if applicable)

| New/Replacement Program Goal | Which institutional goals will be advanced upon completion of this goal? (select all that apply) | Status Update – Action Plan |
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| | ☐ 1: Student Learning<br>☐ 2: Student Progression and Completion<br>☐ 3: Facilities<br>☐ 4: Oversight and Accountability<br>☐ 5: Leadership and Engagement | |

**Best Practices:**

Programs often do something particularly well; usually they have learned through assessment – sometimes trial and error – what solves a problem or makes their programs work so well. These are often called Best Practices and can help others. Please share the practices your program has found to be effective.

Chemical education research has advanced significantly in the last few decades. There has been a great deal of research to determine how to teach the subject more effectively. The chemistry department uses many research-based techniques to ensure student learning is successful. Real-world applications of chemistry are explained to increase student interest. Concrete examples are used to help students learning new concepts in which abstract reasoning may not yet be developed in the specific subject. iClickers are used in to break up lectures and increase the time students are paying attention. Videos representing the animations of the microscopic world of atoms are incorporated to help students develop a mental picture of atoms.

**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).

1. Please report on any unexpected changes or challenges that your program encountered this cycle:
   - We were hit by the loss of several department faculty early last fall. Their classes were successfully managed by five professors sacrificing their sanity while taking on large overloads and, in some cases, swapping schedules to help one another out.

2. How does your trend data impact your decision making process for your program?

- Our primary force for course offerings comes from the demand of the various programs we are a part of (engineering, biology, the health sciences, the bachelor's degree program, and students intending to transfer in chemistry. The classes we offer are quite gender and ethnicity neutral, and our faculty are pretty well mixed by a variety of measures.
- One area that has been under some scrutiny recently is the possibility of expanding the physical science course menu to include at least a chemistry version with a focus on chemistry's role in societal issues.

3. Were there any changes to student success and retention for face-to-face, as well as online/distance courses?
   - Not really. We pace pretty well with the college as a whole, always being a bit behind the overall distribution. Given the nature of our classes this is not surprising to us.

4. Were there any changes to student demographics (age, gender, or ethnicity) for the past cycle?
   - There is not a large change in student demographics. It does appear that our students are getting younger, and there is a slow shift toward more Hispanics in the population. These are likely a reflection of the community college being seen as a viable entry for college-bound students who plan to transfer.
   - We will continue our efforts to promote the discipline to ALL ethnic groups, but point out that some are so small in number (even at the college level) that they may not change much at all. Small fluctuations in those numbers can cause seemingly large shifts in the percentages without really meaning much.

**Resource Request and Analysis:**

| Resource Request | | If Fulfilled, Discuss How Previous Year's Requests Impact Program Effectiveness? |
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| **Positions:** *Discuss the impact new and/or replacement faculty and/or staff had on your program's effectiveness.* | ☐ 1: Classified Staff<br>☒ 2: Faculty | Three full-time faculty members were hired: two tenure-track positions and one temporary position. The addition of these faculty members has allowed us to offer more sections of high-demand classes and has reduced the overload on some of the current faculty members. This has allowed us to reach a larger number of students. In addition, the new faculty members have contributed innovative ideas in teaching. Increasing the number of faculty has also allowed the role of being on a committee to be spread out amongst more people. It has also given current faculty more of an ability to focus on their teaching now that their load has been reduced somewhat. All of this helps to keep our students on their respective pathways throughout their time at BC. |
| **Professional Development:** *Describe briefly, the effectiveness of the professional development* | ☐ 1: Provided Professional Development<br>☒ 2: Attended Professional Development | Many faculty members have taken the Canvas on-line course. This has allowed them to improve and increase the use of Canvas in their course. |

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| *your program has been engaged in (either providing or attending) during the last cycle* | | Some have gained familiarity with new apps which have been adopted, giving them the benefits of immediate student feedback (Zipgrade) and greater connectivity with their classes (adoption of Remind). |
| **Facilities:**<br>*If your program received a building remodel or renovation, additional furniture or beyond routine maintenance, please explain how this request or requests impacts your program and helps contribute to student success.* | ☒ 1: Space Allocation<br>☐ 2: Renovation<br>☐ 3: Furniture<br>☐ 4: Other<br>☐ 5: Beyond Routine Maintenance | The new office space that was given to one faculty member is in a location with an area large enough for a number of students to sit down. There is also a white board. This design allows for much more welcoming and effective interaction between faculty and students.<br><br>(Improvements are desperately needed in another office area shared by multiple professors. This is addressed below.) |
| **Technology:**<br>*If your program received technology (audio/visual – projectors, TV's, document cameras) and computers, how does the technology impact your program and help contribute to student success?* | ☐ 1: Replacement Technology<br>☐ 2: New Technology<br>☐ 3: Software<br>☐ 4: Other_____ | |
| **Resource Request** | | **Discuss How Effective Request is for Student Success?** |
| **Other Equipment:**<br>*If your program received equipment that is not considered audio/visual or computer equipment technology, please explain how these resources impact your program and help contribute to student success.* | ☐ 1: Replacement<br>☐ 2: New<br>☐ 3: Other_____ | |
| **Budget:**<br>*Explain how your budget justifications will contribute to increased student success for your program.* (*Fiscal requests will be submitted by the* | The chemistry group's size and consequent increased course offerings have only increased stress on our spending, as all classes use materials constantly. Additionally the physics and geology areas are experiencing growth with us; new people are bringing in fresh, new ideas not constrained by habit. Combined with this is the exploration of new frontiers by several old dogs, which requires constant feeding as well.<br><br>Such a a state necessarily is part of a program which maintains a modern, up-to-date laboratory setting as well as exploring current excellent pedagogical approaches to enveloping our students in our chemical world. | |

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| *faculty chair and/or area administrator.)* | This is spoken about in the conclusion as well, below.<br><br>An additional request for funding encompasses our wishes to attend the 2018 Biennial Conference on Chemical Education (the BCCE, sponsored by the American Chemical Society). This serves several excellent professional development purposes including<br>• Learning about research proven practices in teaching and learning chemistry<br>• Finding new and innovative activities or labs to recharge our classes, and<br>• Networking with other chemistry educators from across the country and around the world<br>This has had a wonderful effect on our group in the past, and provided us with many new ideas to try. It is an opportunity we do not want to miss. |

**Conclusions & Snapshot:**

Present any conclusions and findings about the program. This is an opportunity to provide a brief abstract or synopsis of your program's current circumstances and needs. Consider this a snapshot of your program, if someone were to only read this portion of your annual program review.

The chemistry department has increased from five to nine full-time faculty in three years. This is allowing us to address the bottlenecks which have existed in past years, with those issues beginning to move beyond us into those disciplines served. Our degree has evolved into its transfer equivalent, with our now offering a complete and robust program to people seeking a career in chemistry and/or other STEM areas. While articulation with the CSUs remains problematic (through no fault of our own), other schools have accepted our program completely, asking if anything for even greater coverage of math and physics sequences.

Despite the increase classes continue to have large waitlists and many students are unable to enroll in the class the first semester they register for the course. The facilities for the chemistry department are very crowded and old. It makes it very difficult for students to work efficiently in the classroom and laboratory. Students frequently have to perform labs in hoods in a classroom down the hall from their lab or crowd around one or two hoods.

Additionally, with this growth and increase in offerings, we are running out of supply money sooner than ever before. Last year the stockroom was penniless before the end of the year. It is anticipated that we will go broke much earlier this year. This will seriously affect our classes.

The design of the classrooms and office space does not provide for an environment of students studying in groups in the science buildings. Office space for faculty is spread out over three different buildings. There is little to no space to help students that visit a professor in their office.

It is hoped that funding for a new building will appear shortly so that we can move forward with plans to address these issues.