



2018-19 Program Review – Instructional

Program Name: Chemistry

Date: January 30, 2019

Please verify the mission statement for your program. If there is no mission statement listed, please add it here.

The Chemistry Program mission is to:

- Promote student success, increase accessibility, and improve equity;
- Improve retention and outcomes in chemistry;
- Provide our diverse community with educational opportunities and training in the STEM fields, such as earning an AS degree in Analytical Chemistry and Biotechnology;
- Provide effective instruction, student support, tutoring and mentoring to ensure a successful transfer to 4-year college or university and build a career in the STEM fields.

List your Faculty and/or Staff

Full Time:

- Sam Gillette
- Siraj Omar

Part Time:

- Ali Dehghani
- Paul Henderson
- Anu Sharma
- Neeta Sharma
- Gurnam Singh

Lab Manager & Technician

- Natalia Fedorova
- Azul Lewis

The Program Goals below are from your most recent Program Review or APU. If none are listed, please add your most recent program goals. Then, indicate the status of this goal, and which College and District goal your program goal aligns to. If your goal has been completed, please answer the follow up question regarding how you measured the achievement of this goal.

Program Gold-#1: To build a foundation for students to make a careers in the STEM fields.

- Status: In-Progress
- College GOAL III: Enhance Career-Technical Education Certificates and Degrees: Enhance BCC's 1- and 2-year career and technical education programs so that they provide current and transferable skills and competencies to earn a living wage.

Program Gold-#2: To increase students knowledge, computational and critical thinking skills to ensure a successful transfer to a 4-year institution, and be successful in their selected fields of majors.

- Status: In-Progress
- College GOAL IV: Increase Transfer and Transfer Degrees: Ensure that all of BCC's programs of study and transfer pathways for degrees prepare students, in a timely manner, for multiple transfer options.

Program Gold-#3: The BCC Chemistry program also offers AS degree in Analytical Chemistry that focuses on training students to qualify for an entry level lab technician position.

- Status: In-Progress
- College GOAL III: Enhance Career-Technical Education Certificates and Degrees: Enhance BCC's 1- and 2-year career and technical education programs so that they provide current and transferable skills and competencies to earn a living wage.

Describe your current utilization of facilities, including labs and other space

Office spaces: Rooms 511 and 523 are shared by full-time faculty, some part-time faculty and classified staffs (lab manager and lab technicians. More office space need to accommodate part-time faculty.

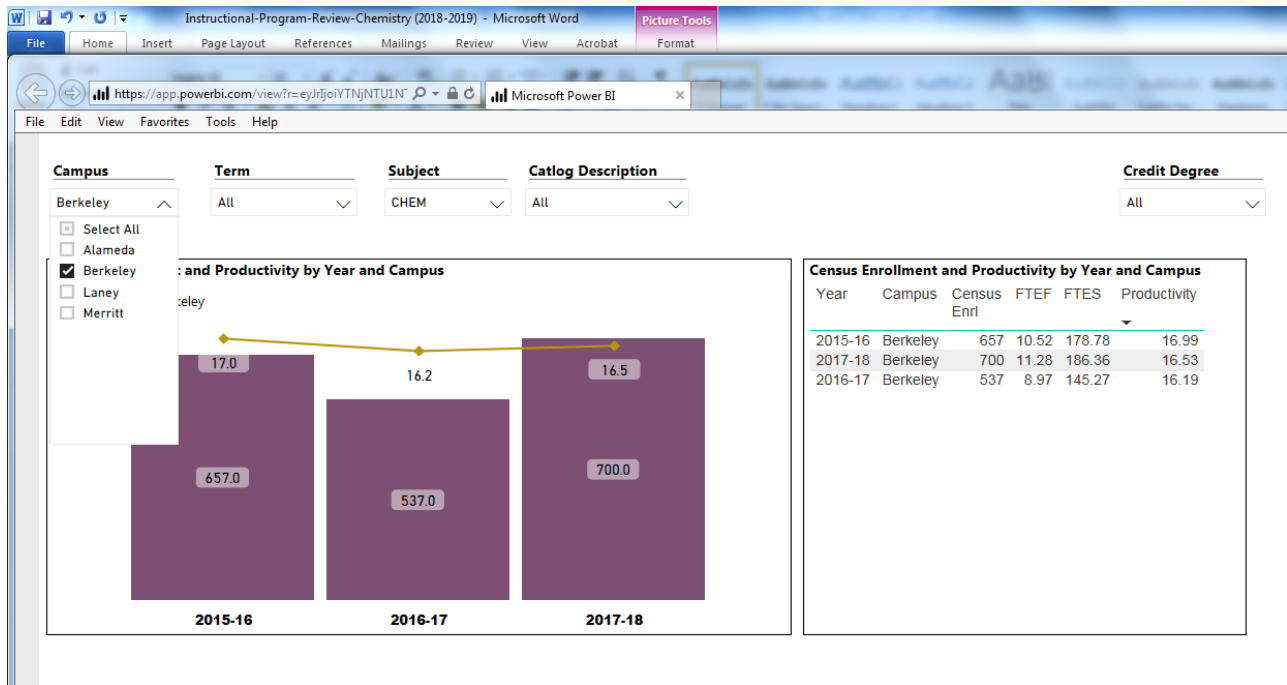
Lab spaces: Room 514 and 521 are available lab spaces for the Chemistry Program – room 514 is dedicated for use by organic chemistry and analytical chemistry classes, while room 521 is shared by Chem 30A, Chem 1A and Chem 1B. In addition, the department also has a small room (room 515) to house all the analytical equipment for biology and chemistry and a storage room for the Science Department supplies and surplus.

Additional Space needed: The current available space (lab and office) does not allow for the expansion of the chemistry program. Future expansion of the chemistry program will require the following additional space:

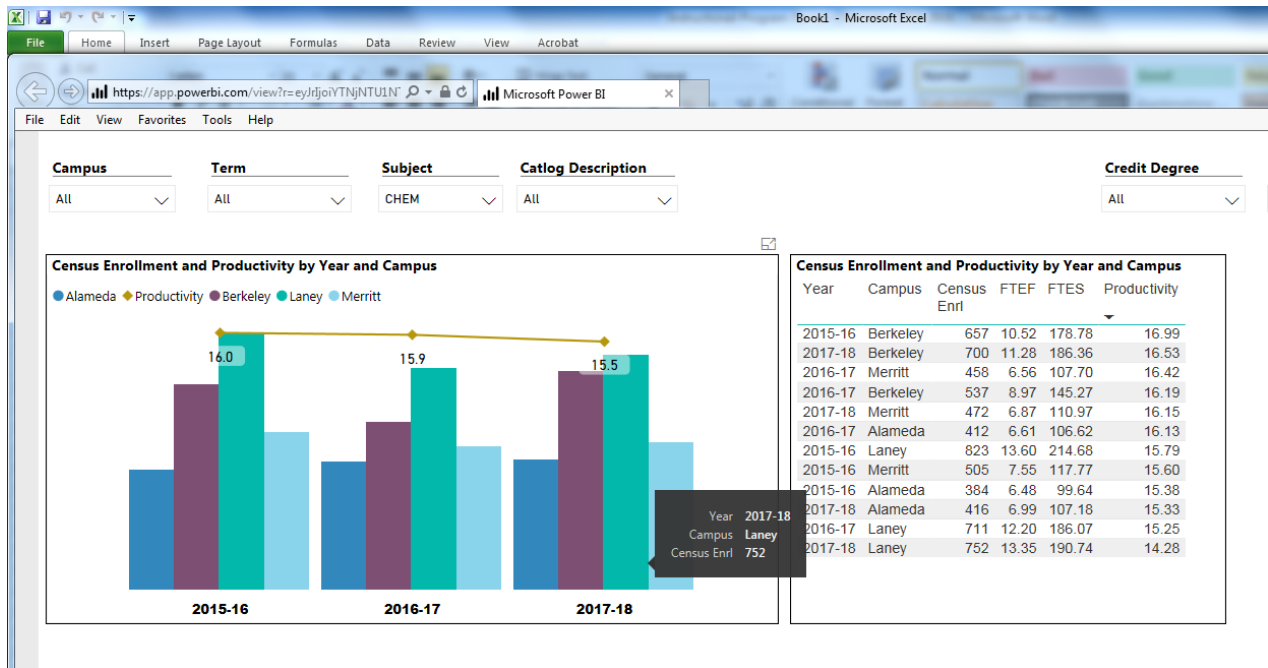
- one new general chemistry laboratory;
- one dedicated room for tutoring and study session, and
- Sufficient office space part-time faculty to work or hold office hours. All part-time instructors are eager to hold office hours, either before or after the lecture periods; however, there's no room for them to do so that provides some degree of quietness and privacy.

Enrollment Trends and Productivity for Chemistry at BCC

For Period: Fall 2015 – Spring 2018



Enrollment Trends and Productivity for Chemistry at Peralta



Enrollment Trends Power BI dashboard

Note: Please consider the most recent 3 years when answering the questions below.

Set the filters above to your discipline, and discuss enrollment trends over the past three years

With the exception of Chem 18 (Analytical Instrumentation), which is a specialized course and relatively new, all chemistry classes were full to capacity or slightly overload each semester classes are offered, especially Chem 30A and Chem 1A, which are prerequisite courses for most major disciplines in science and technology.

Set the filter above to consider whether the time of day each course is offered meets the needs of students.

With the exception of two of the Chem 30A sections, all chemistry classes are offered during the day time. Regardless of the time classes are scheduled, all sections are filled to capacity by the time each semester began. Many sections are closed to registration within 2-3 weeks of enrollment period. This is due to the high demand of the general chemistry classes for many science majors and professions.

Are courses scheduled in a manner that meets student needs and demands? How do you know?

- BCC offers both day and evening time Chem 30A (2 sections in the morning and 2 in the evening), which is the most demanded class as it is required for the nursing and biotech programs, and also a prerequisite for Chem 1A.
- Due to limited laboratory space, only two lab sections can be offered per evening. As such, all other chemistry classes are offered during the day time, except for Chem 18, which offered in the evening every spring semester.
- In addition, due to the constrain of classroom availability, the scheduling of some of the chemistry classes has to break away from the normal MWF or TTh combinations. Two of the Chem 30A sections are offered in Tuesday-Friday morning and Thursday-Friday morning combinations, with Friday being the lecture time, and Tuesday and Thursday being the lab time. More lecture rooms are available on Friday than any other days of the week.
- Regardless of the time and days class are offered, most chemistry sections are filled up and close to registration within the first 2-3 weeks of enrollment periods.

Describe effective and innovative teaching strategies used by faculty to increase student learning and engagement.

Chemistry boot camp:

- For the last 2 years, the chemistry department offers a chemistry boot camp before each semester began (including summer intersession) to students who are enrolled in Chem 1A that coming semester.
- The objective of the boot camps is to help students prepare for Chem 1A as this is the most challenging class in chemistry. In fact, Chemistry 1A has the highest attrition rate in colleges in PCCD.

- The boot camp was introduced at BCC to alleviate this problem. However, the results were a bit sketchy as it was not made mandatory to all students enrolled in Chem 1A.
- To solve the high attrition rate in Chem 1A, the chemistry department in all colleges in the PCCD decided to introduce Chem 30A (Introductory General Chemistry) as chemistry prerequisite for Chem 1A, in addition to intermediate algebra, effective Fall 2018. We are monitoring the effectiveness of this additional prerequisite on student success in this course.

College hour tutorial/study sessions:

- The department also conducts daily tutorial and study group sessions for chemistry classes during college hours (M – F) to help students with lecture materials and homework assignments. The tutorial sessions are facilitated by our capable and experienced chemistry lab technician, Ms. Azul Lewis, who is assisted by student TA's as well as student volunteers from UC Berkeley. Students find these tutorial and group study sessions very helpful.

Lunchtime STEM career seminars:

- The science department continues to invite speakers from UC Berkeley, Lawrence Berkeley Lab and other private research institutions around the Bay Area to give lunchtime seminars.
- Speakers talked about their work and research that focus on science related fields.
- The objective of this seminar series is to expose our students to the STEM field and opportunities that are available to them in this field.
- It is also to encourage our students, especially those from under-represented communities, to major in STEM fields. Students are encouraged to attend each lunchtime seminar session and be active participants.

How is technology used by the discipline, department?

- Chemistry courses focus on problem solving skills and critical thinking.
- The most effective method of teaching this skills is through face-to-face instructions and demonstration using white-board and markers, and occasionally using molecular models.
- Group discussions enhance a strong understanding of the concept in chemistry.
- Instructors also use power-point slides and relevant videos that are available online in their teaching techniques. Some post their power-point lecture materials on Canvas and make them available to students outside the lecture periods.

How does the discipline, department, or program maintain the integrity and consistency of academic standards with all methods of delivery, including face to face, hybrid, and Distance Education courses?

- The department offer face-to-face lectures and hands on laboratory activities/experiments to ensure students learn both concepts and skills in mathematical computation as well as manual handling of chemicals and analytical equipment.
- Academic standards are delineated in class syllabi and actively enforced in lectures and laboratory experiments.
- When a course has more than one section that are taught by different instructors, they consult each other before each semester begins and come to agreement (as much as possible) in terms of the sequence of topics to be covered in lectures and labs.

- Most instructors use both power point slide presentation and white board during lecture; some also made lecture materials available on Canvas to make it easier for students to review the materials. Although some topics are better taught with a marker on white boards, having similar sets of lecture materials posted on Canvas are very useful for students to review.

Curriculum

Please review your course outlines of record in CurriQunet Meta to determine if they have been updated or deactivated in the past three years. Specify when your department will update each one, within the next three years.

The following courses were updated in January 2017:

- CHEM 1A – General Chemistry - updated 1/13/2017
- CHEM 1B – General Chemistry - updated 1/11/2017

The following courses are overdue for update and will be updated by September 2019:

- CHEM 12A – Organic Chemistry
- CHEM 12B – Organic Chemistry
- CHEM 30A – Introductory General Chemistry
- CHEM 30B – Introduction to General, Organic and Biological Chemistry

The following course is in the process of being updated:

- CHEM 18 – Analytical Instrumentation

The following noncredit course is currently being developed:

- CHEM 501A – Basic Chemistry Lab Technician Training Part-1;
- CHEM 501B – Basic Chemistry Lab Technician Training Part-2.

CurriQunet Meta

Please summarize the Discipline, Department or program of study plans for curriculum plans for improvement. Below, please provide details for individual course improvement. Add plans for new courses here.

The department is taking the following measures:

- Courses that are due for update, will be updated within this year;
- The department is in the process of creating a noncredit chemistry course that runs concurrently with Chem 1A. The goal of this noncredit course is to provide a support mechanism to students enrolled in Chem 1A in order to ensure their success in this class; the noncredit course is also to become a pre-training session for students who want to work as a lab technician while enrolled at BCC.
- The department is also in the process of developing a Level 1 Certificate of Achievement in Analytical Chemistry with the goal to attract more students to enroll in AS Degree in Analytical Chemistry and be comfortable with working as entry level research technicians in chemistry related fields.

Assessment – Instructional

Student Learning Outcomes Assessment

List your Student Learning Outcomes

Chem 1A and Chem 1B SLO's:

Upon completing this course students will acquire the following knowledge and skills:

1. Solve quantitative chemistry problems and integrate multiple ideas that include incorporating stoichiometric and algebraic relationships, in problem solving processes.
2. Explain qualitative trends in physical and chemical properties of elements and use molecular level concepts (physical and/or chemical) to explain macroscopic properties of matter.
3. Perform experiments according to laboratory safety procedures; collect and analyze experimental data; interpret results that include graphs construction; write organized laboratory reports.

Chem 12A Student Learning Outcomes (SLO's):

Upon completing this course students will acquire the following knowledge and skills:

1. Nomenclature - Apply naming rules (nomenclature) to name or draw the structures for organic molecules and, where appropriate, indicate stereochemistry.
2. Bonding - Describe the overall structure and properties of organic molecules using the principles of chemical bonding, atomic hybridization, and orbital theory.
3. Mechanisms - Apply thermodynamic and kinetic principles to characterize organic chemical reactions and mechanisms.
4. Spectroscopy - Use common spectroscopic techniques (NMR, IR, UV/Vis, MS) to determine the molecular structure of organic compounds and also to correlate with chemical reactivity.
5. Lab Safety - Operate in the laboratory using routine acceptable safe laboratory practices to handle chemicals, glassware, and common laboratory equipment. (Apply the precautionary principle when handling hazardous materials, especially those of unknown toxicity.)
6. Notebook - Record laboratory results and data correctly in a scientific notebook and report and interpret results using appropriate notational and descriptive content in standard scientific format. Students demonstrate information competency when they:

Chem 12B Student Learning Outcomes (SLO's):

Upon completing this course students will acquire the following knowledge and skills:

1. Nomenclature - Apply naming rules (nomenclature) to name or draw the structures for organic molecules and, where appropriate, indicate stereochemistry.
2. Bonding - Describe the overall structure and properties of organic molecules using the principles of chemical bonding, atomic hybridization, and orbital theory.
3. Mechanisms - Apply thermodynamic and kinetic principles to characterize organic chemical reactions and mechanisms.
4. Spectroscopy - Use common spectroscopic techniques (NMR, IR, UV/Vis, MS) to determine the molecular structure of organic compounds and also to correlate with chemical reactivity.
5. Lab Safety - Operate in the laboratory using routine acceptable safe laboratory practices to handle chemicals, glassware, and common laboratory equipment. (Apply the precautionary principle when handling hazardous materials, especially those of unknown toxicity.)
6. Notebook - Record laboratory results and data correctly in a scientific notebook and report and interpret results using appropriate notational and descriptive content in standard scientific format.
7. Synthesis – Devise synthetic approaches to relatively simple organic compounds using the concepts of multistep synthesis, which includes retro-synthetic analysis.

Chem 18 Student Learning Outcomes (SLO's):

Upon completion of this course, students will be able to do the following:

1. Describe the chemical separation techniques, quantitative analysis and spectroscopic analysis.
2. Examine structure of compounds using polarimetry, UV-Vis, IR, NMR and Mass spectroscopy, HPLC, and GC techniques to determine the qualitative and quantitative characteristics.
3. Safely handle laboratory chemicals and analytical equipment and interpret experimental data and results.

Chem 30A Student Learning Outcomes (SLO's):

Upon completing this course, students will acquire the following knowledge and skills:

1. Solve quantitative chemistry problems using simple algebraic processes related to mole concept and reaction stoichiometry.
2. Demonstrate knowledge of the Periodic Table and Trends in periodic properties of elements, write chemical formulas as per IUPAC system of nomenclature and write and balance the chemical equations.

Chem 30B Student Learning Outcomes (SLO's):

Upon completion of this course, students will be able to do the following:

1. Solve quantitative chemistry problems using simple algebraic processes related to mole concept and reaction stoichiometry;
 2. Identify and describe Periodic Table and trends in periodic properties of elements; write chemical formulae as per IUPAC system of nomenclature; write and balance chemical equations
- Upon completing this course, students will acquire the following knowledge and skills:

Were there any obstacles experienced during assessment? What worked well? (Mainly based on evidence in the report, attach other evidence as necessary)

All SLO's for chemistry classes have been assessed (at least once) during the last 3 years, except Chem 30B; this was because the previous instructor for Chem 30B was reluctant to conduct SLO assessment for the class, and then, during the past 3 semesters, the department was not able to offer the class due to poor enrollment.

What percent of your programs have been assessed? (mainly based on evidence in the report, attach other evidence as necessary; note: a complete program assessment means all Program Learning Outcomes (PLOs) have been assessed for that program)

All chemistry classes had the SLO's assessed, at least once, during the first round of assessment process. The second round of SLO Assessment for chemistry classes will start this semester.

SLO Assessment Report from previous round:

	A	B	C	D
1	COURSES	Data available from previous rounds?	Action Plan from Previous Rounds?	
2	CHEM 001A-General Chemistry	Y	Y	
3	CHEM 001B-General Chemistry	Y	Y	
4	CHEM 012A Organic Chemistry	Y	Y	
5	CHEM 012B Organic Chemistry	Y	Y	
6	CHEM 030A-Introductory Inorganic Chemistry	Y	Y	
7	CHEM 030B-Introductory Organic and Biochemistry	Y	Y	
8				

How has your dept worked together on assessment (planning together)? Describe how your dept works well on assessment? Describe things that went well or obstacles. What aspects of assessment work went especially well in your department and what improvements are most needed?

- Most assessments were done using common exam problems the instructors have selected for different sections, and see how students from each of those section performed. For general chemistry classes, SLO questions focused on computational skills and on comprehension.
- All classes did quite well on computational skills, but needed more work on how to explain concept – the narrative portion is a bit challenging to students whose have English as a second language.
- Repetition might solve this problem, and practice exercises on problem solving will improve their computational skills.
- In general, chemistry instructors are very cooperative and supportive of the departmental decision regarding SLO assessment process.

Collaboration

For classes with more than one section that are taught by different instructors, such as Chem 30A and Chem 1A, instructors communicated with one another and reached consensus on the method and number of assessment.

Leadership Roles

None

Planning Process

SLO assessments for the Science Department are normally coordinated by the department liaison officer to the Assessment Committee, Dr. Pieter de Haan, who is also the current Co-Chair for the Assessment Committee. He provides a spreadsheet that contain the semester each course will be assess, and the department chair will inform faculty members that their course is up for assessment. If for some reason the faculty cannot carry out the assessment in the indicated semester, he/she can request to do the assessment in the following semester in the assessment cycle.

Dept meetings for Collaboration

SLO assessments are often discussed during department meeting and Dr. Pieter de Haan, the Co-Chair for the SLO Assessment Committee discuss the timeline for the round 2 assessment process for the science department and explain how the assessment could be carried out for different classes, and what data need to be collected.

Data Analysis

Not Available

What were the most important things your department learned from assessment? Did implementation of your action plans result in better student learning? In other words, how has your department used the results of assessment to improve student learning and/or curriculum? Please be as detailed as possible.

Data currently not available.

Does your department participate in the assessment of multidisciplinary programs? If Yes, Describe your department's participation and what you learned from the assessment of the program that was applicable to your own discipline.

No.

Does your department participate in your college's Institutional Learning Outcomes (ILOs) assessment? If Yes, Please describe your departments participation in assessing Institutional Learning Outcomes.

Not yet.

What support does your department need from administrators, assessment coordinators and/or your campus assessment committee to continue to make progress in assessment of outcomes and implementation of action plans?

The science department need a staff assistant or someone to analyze SLO assessment data that can be used to advice faculty members on the SLO assessments. If that some one is a faculty member from the department, he/she should be given a reasonable stipend for his/her time.

Please verify the mission statement for your program. If there is no mission statement listed, please add it here.

The Chemistry Program mission is to:

- Promote student success, increase accessibility, and improve equity;
- Improve retention and outcomes in chemistry;
- Provide our diverse community with educational opportunities and training in the STEM fields, such as earning an AS degree in Analytical Chemistry and Biotechnology;
- Provide effective instruction, student support, tutoring and mentoring to ensure a successful transfer to a 4-year college or university and build a career in the STEM fields.

Course Completion

Course Completion Power BI Dashboard

Consider your course completion rates over the past three years (% of student who earned a grade of "C" or better).

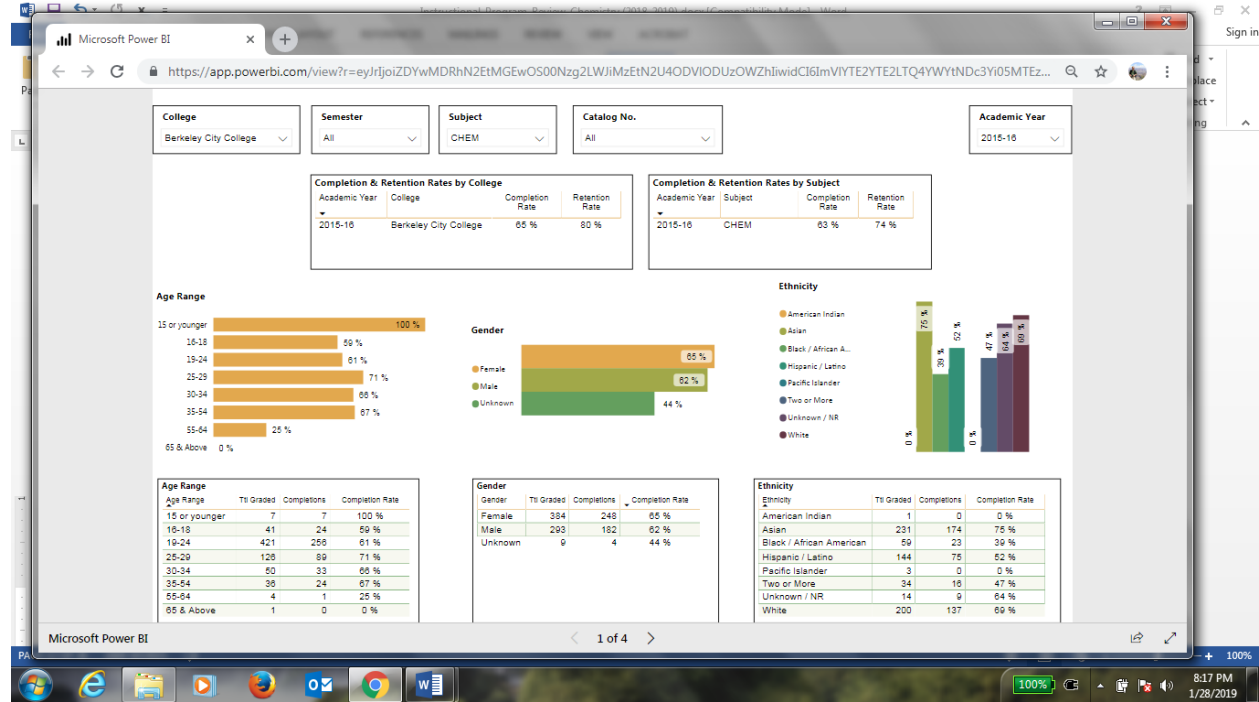
Use the filters on the top and right of the graphs to disaggregate your program or discipline data. When disaggregated, are there any groups whose course completion rate falls more than 3% points below the discipline average? If so, indicate yes and explain what your department is doing to address the disproportionate impact for the group.

Completion and Retention Rates in Chemistry

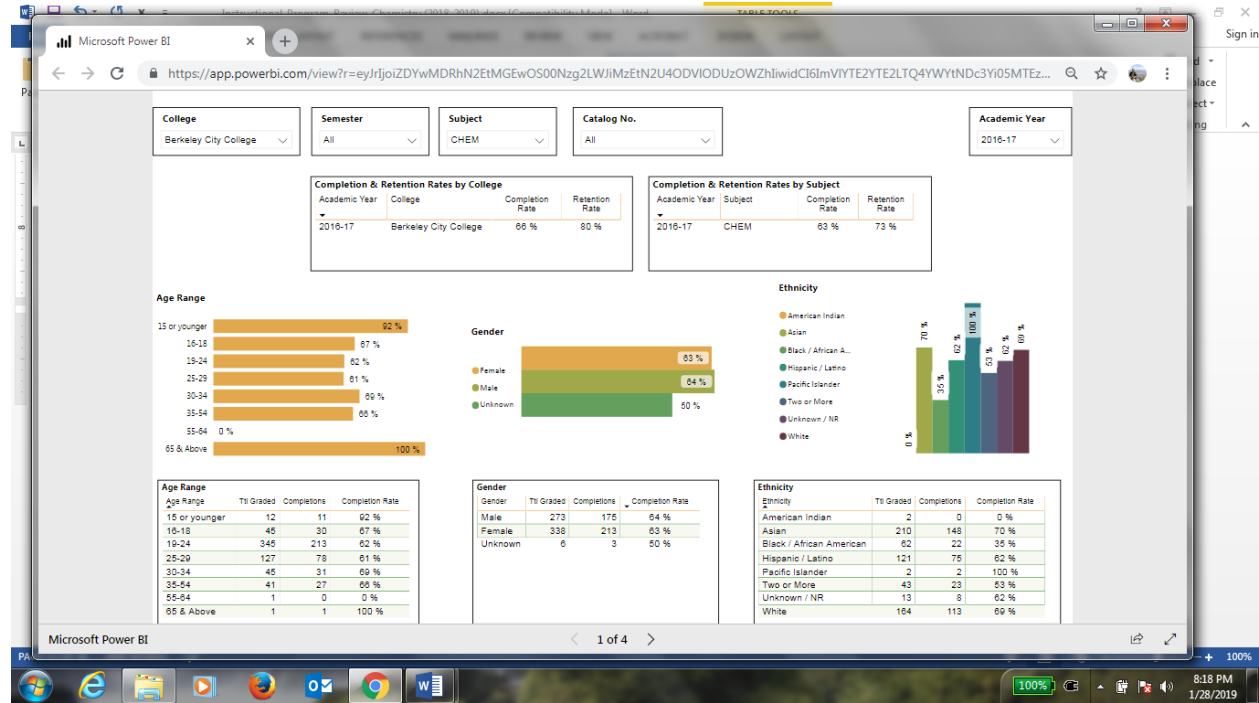
Academic Year	BCC Rates		CHEMISTRY Rates	
	Completion	Retention	Completion	Retention
2017-2018	66%	79%	66%	75%
2016-2017	66%	80%	63%	73%
2015-2016	65%	80%	63%	75%

Age

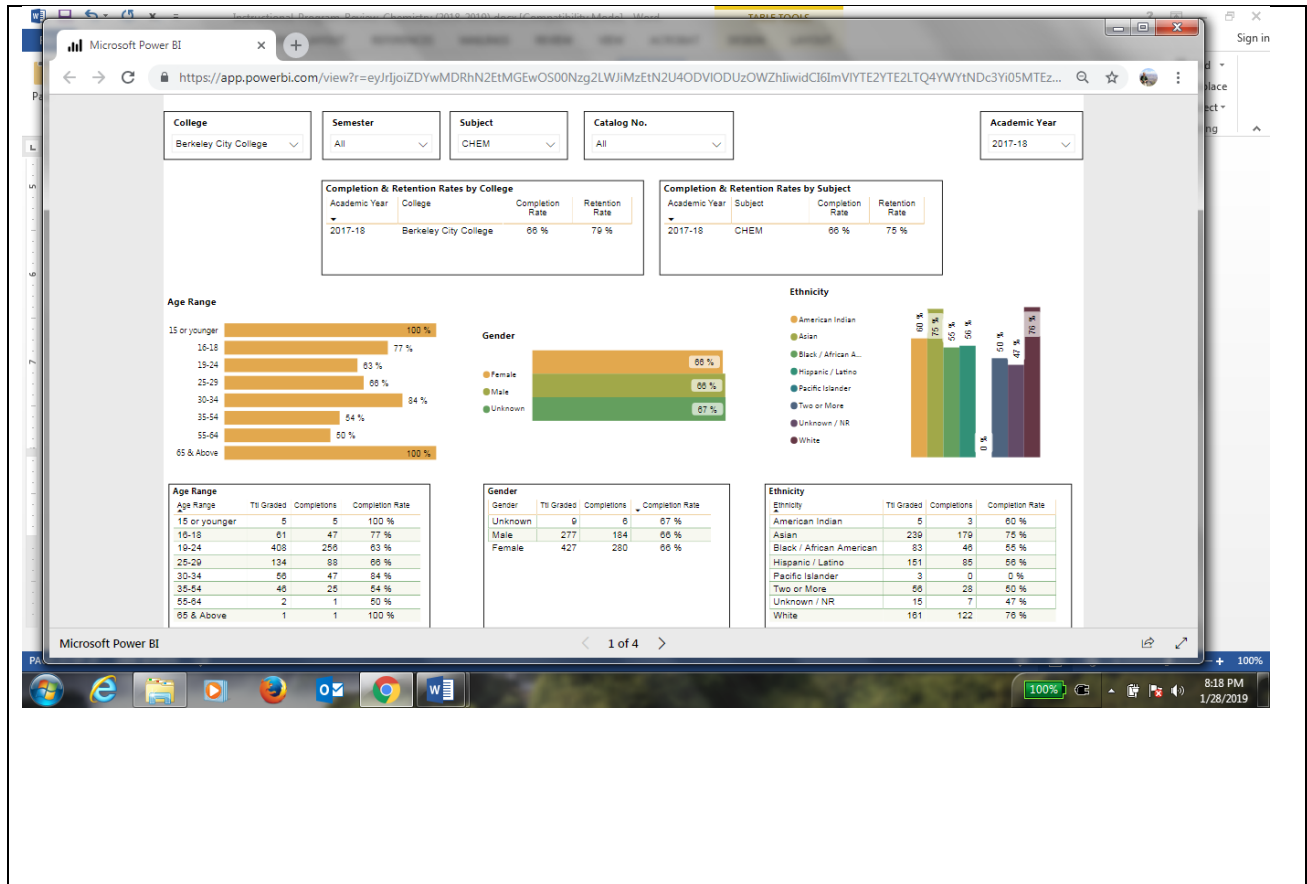
Academic Year: 2015 – 2016



Academic Year: 2016 – 2017



Academic Year: 2017 – 2018



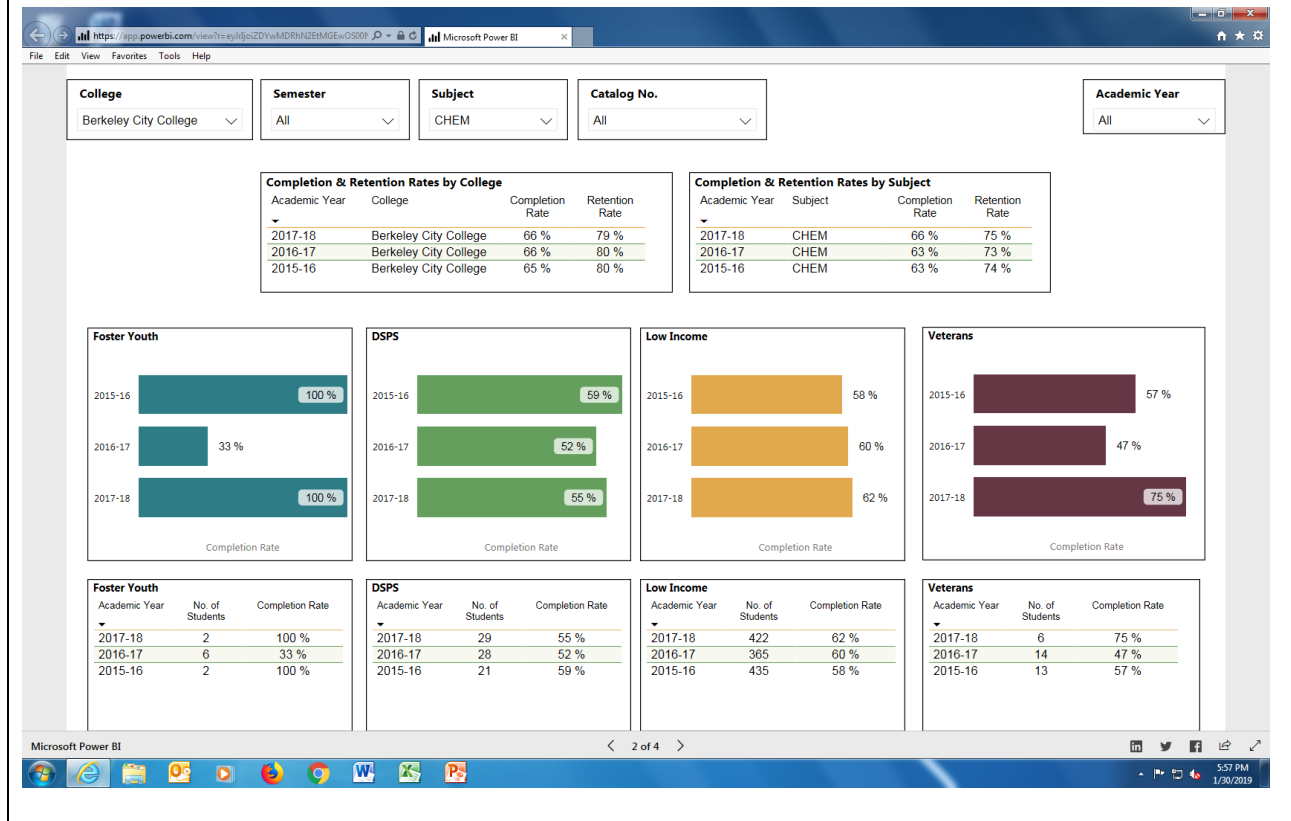
Ethnicity

Please see the previous three charts on Completion and Retention Rates by Age Range, Gender & Ethnicity.

Gender

Please see the previous three charts on Completion and Retention Rates by Age Range, Gender & Ethnicity.

Foster Youth Status



Disability Status

Please see the previous three charts on Completion and Retention Rates by Foster Youth, DSPS, Low Income, and Veterans.

Low Income Status

Please see the previous three charts on Completion and Retention Rates by Foster Youth, DSPS, Low Income, and Veterans.

Veteran Status

Please see the previous three charts on Completion and Retention Rates by Foster Youth, DSPS, Low Income, and Veterans.

Consider your course completion rates over the past three years by mode of instruction. What do you observe?

Face-to-Face

All Chemistry courses are taught face-to-face

Hybrid

N/A – no hybrid class

100% Online

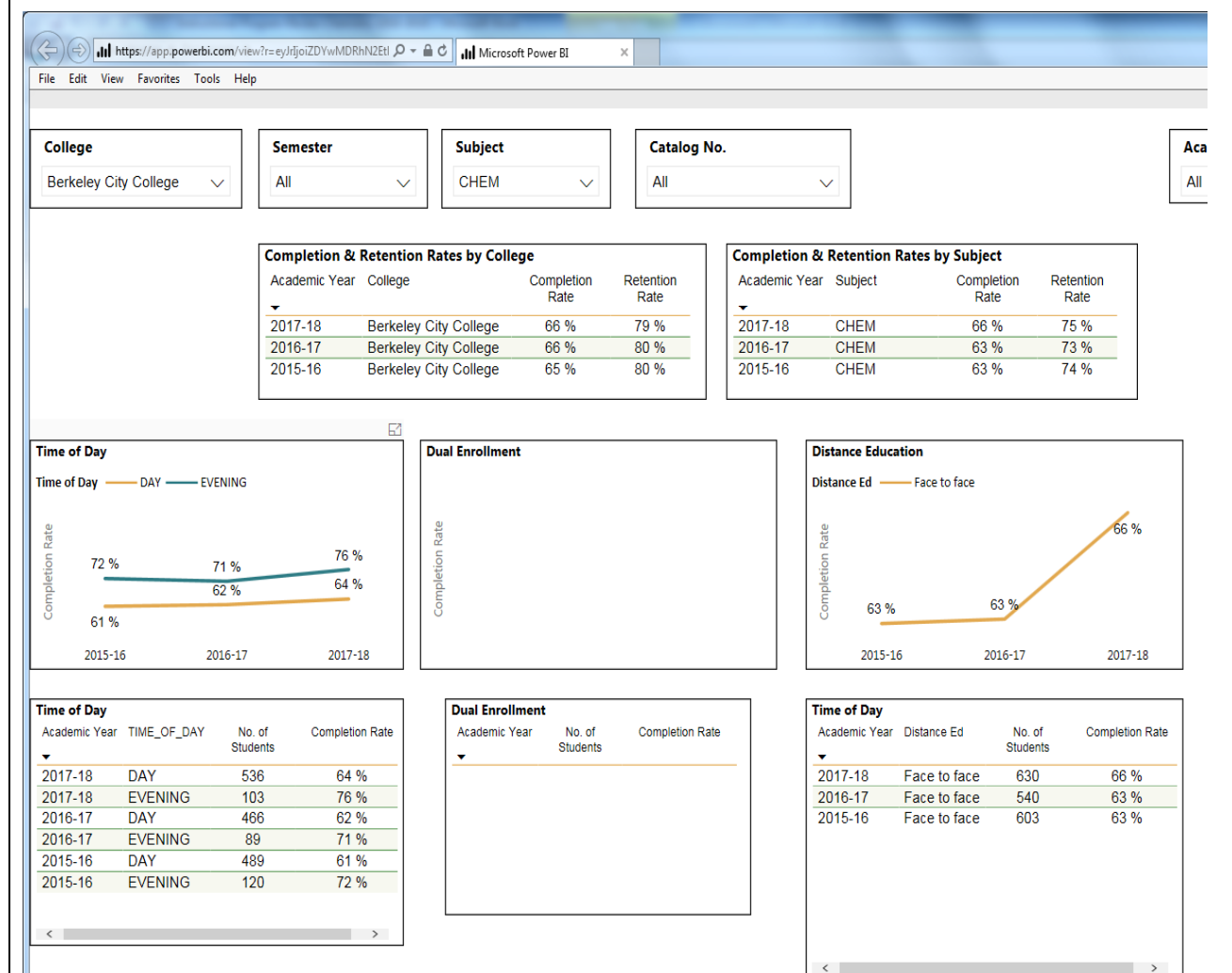
N/A – no online course

Dual Enrollment

None

Day time

Day & Evening time



Evening Time Completion/Retention Rates

Please see above chart for Completion and Retention Rates Day Time versus Evening time.

How do the course completion rates for your program or discipline compare to your college's Institution-Set Standard for course completion?

Overall, the completion rates for chemistry classes is slightly lower than the college average; last 3 years average completion rate for chemistry was 64.0% compared with 65.7% for college.

How do the department's Hybrid course completion rates compare to the college course completion standard?

N/A

Are there differences in course completion rates between face to face and Distance Education/hybrid courses? If so, how does the discipline, department or program deal with this situation? How do you assess the overall effectiveness of Distance Education/hybrid course?

N/A

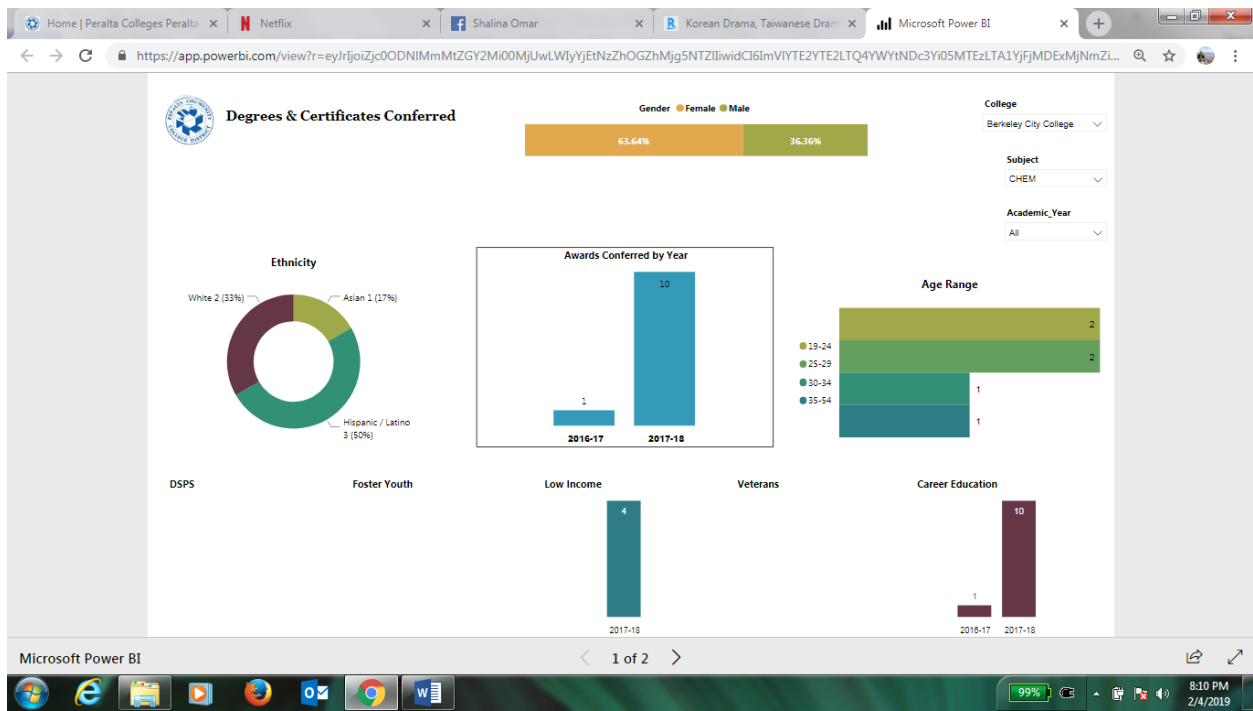
Describe the course retention rates over the last three years. If your college has an Institution-Set Standard for course retention, how does your program or discipline course retention rates compare to the standard?

Overall, the retention rates for chemistry is slightly lower than the college average; last 3 years average retention rate for chemistry is 74.3% compared with 79.7% for the college.

What has the discipline, department, or program done to improve course completion and retention rates?

- Starting Fall 2018 the department added Chem 30A (in addition to intermediate algebra) as prerequisite for Chem 1A. This is to ensure that students enrolled in Chem 1A are better prepared to improve the completion and retention rates.
- The department also provides daily tutorial sessions for all chemistry students, especially students enrolled in Chem 1A, Chem 1B and Chem 30A. These tutorial sessions were supported by Strong Work Force and Perkins Funding. The department also gets volunteer tutors from UC Berkeley chemistry students.
- The department is in the process of creating a noncredit chemistry course that will run concurrently with Chem 1A class, which will support Chem 1A students with problem solving techniques.

Degrees & Certificates Conferred



Degrees & Certificates Power BI dashboard

What has the discipline, department, or program done to improve the number of degrees and certificates awarded? Include the number of degrees and certificates awarded by year, for the past three years.

AS Degree in Analytical Chemistry is a very new program, which only started in 2016-2017, and enrollment in this program is currently quite low. We had one student graduated in this program in 2016-2017 and 5 students in 2017-2018.

- Most students taking chemistry at BCC are preparing them for transfer to a 4-year college or university, or to a professional degree such as medicine, dentistry, and pharmacy.
- Their focus is to obtain good grades so that they will be accepted to a reputable university, such as UC Berkeley, UCLA, UC Davis or UC San Diego, rather than training for a job in laboratories.
- The department strongly encourages students to enroll in the AS Degree program by providing incentive such as paid job training in the chemistry lab.
- The department is developing a low level Certificate of Achievement (CA) in Analytical Chemistry; this would become a stepping stone for the advanced level CA as well as AS degree.

Over the next 3 years, will you be focusing on increasing the number of degrees and certificates awarded?

The department is currently working on:

- a Level 1 Certificate of Achievement in Analytical Chemistry;
- a noncredit Laboratory Technician Training course in general chemistry;
- a Professional Degree Preparation Certificate for post-baccalaureates;
- an advertising strategy for the CTE programs with the dean's office.

What is planned for the next 3 years to increase the number of certificates and degrees awarded?

The department is currently working on:

- a Level 1 Certificate of Achievement in Analytical Chemistry;
- a noncredit Laboratory Technician Training course in general chemistry;
- a Professional Degree Preparation Certificate for post-baccalaureates;
- an advertising strategy for the CTE programs with the dean's office.

Engagement

Discuss how faculty and staff have engaged in institutional efforts such as committees, presentations, and departmental activities. Please list the committees that full-time faculty participate in.

Dr. Sam Gillette – Vice President of Academic Senate

Dr. Siraj Omar:

- Co-Chair for the Science Department; responsible for the chemistry instructional program in the Science Department;
- Science Department's Rep in the Technology Committee;
- Science Department Rep for the Tutoring Planning Committee;

Natalia Fedorova – an active member of the Facility Committee and Floor Monitor during emergency evacuation.

Discuss how faculty and staff have engaged in community activities, partnerships and/or collaborations.

Through active participation in the committee meetings and involved in the college decision making process.

Discuss how adjunct faculty members are included in departmental training, discussions, and decision-making.

Dr. Neeta Sharma – a senator representing Science Department in the Academic Senate (2016-2018); and have participated in PIE activities;
Dr. Gurnam Singh – a senator representing Part-time Faculty in the Academic Senate (2016-2018)

Prioritized Resource Requests Summary

In the boxes below, please add resource requests for your program. If there are no resource requested, leave the boxes blank.

Resource Category	Description/Justification	Estimated Annual Salary Costs	Estimated Annual Benefits Costs	Total Estimated Cost
Personnel: Classified Staff	Science Department currently has one full-time chemistry laboratory technician supported by the Strong Work Force Funding. In the event that this funding becomes unavailable, the college MUST absorb the cost to retain this position. The department will NOT be able to maintain the current offering of chemistry courses without a full-time lab technician.	\$45,000	\$23,000	\$68,000
Personnel: Student Workers	<p>Student workers or TA's are needed to assist both students and instructors during laboratory experiment to ensure that students learn the correct way of handling chemicals and equipment and that they observe the laboratory safety guidelines. Student workers also help with chemical preparation and lab clean-up.</p> <p>1) Lab TA's (fall and spring): 33 lab-hrs/wk x 32 wks = <u>1056 hrs</u></p> <p>2) Summer Lab TA's: 24 lab-hrs/wk x 6 wks = <u>144 hrs</u></p> <p>3) Tutors (Fall & Spring): 5 hrs/wk x 32 wks = 160 hrs</p> <p>4) Tutors (Summer): 4 hrs/wk x 6 wks = 24 hrs</p> <p>Total # of hours = 1384 hrs</p> <p>Estimated cost: 1384 hrs x \$15 = \$20,760</p>	\$20,760 (p.a.)	?	\$20,760 (p.a.)

Personnel: Part Time Faculty	An additional part-time instructor to teach another section of Chem 1B offered in fall and spring semesters. (Currently the chemistry department has 5 adjunct faculties sharing a total of 38.4 FTE.	\$31,000	?	\$31,000
Personnel: Full Time Faculty	To expand the offering of chemistry classes and sustain the CTE program, the department will require another full-time faculty, preferably in an analytical field.	\$65,000	\$32,000	\$97,000

Resource Category	Description/Justification	Total Estimated Cost
Professional Development: Department wide PD needed	Refreshment for Science Advisory Committee Meetings	\$500
Professional Development: Personal/Individual PD needed	None	

Resource Category	Description/Justification	Total Estimated Cost
Supplies: Software	None	
Supplies: Books, Magazines, and/or Periodicals	None	
Supplies: Instructional Supplies (Consumables and office supplies)	Chemicals, glassware, whiteboard markers & erasers, pencils, pens, printing paper, writing pads, etc.	\$7,500 (p.a.)
Supplies: Non-Instructional Supplies (Equipment service, repair & maintenance)	The department has very expensive analytical equipment such as: <ul style="list-style-type: none"> • Nuclear magnetic resonance spectrophotometer (NMR); • Gas chromatography-mass spectrophotometer (GCMS); • High performance liquid chromatography (HPLC); • Gas chromatography (GC); 	\$5,000 (p.a.)

	<ul style="list-style-type: none"> Infrared spectrophotometer (IR), and UV-Visible spectrophotometer; Altogether, they cost approximately \$250,000. <p>They are sensitive equipment that require regular servicing and maintenance by a professional technician.</p>	
Supplies: Library Collections	None	

Resource Category	Description/Justification	Total Estimated Cost
Technology & Equipment: New	Printer for GC-MS	\$500
Technology & Equipment: Replacement	None	

Resource Category	Description/Justification	Total Estimated Cost
Facilities: Classrooms	<ul style="list-style-type: none"> Another tiered classroom large enough to accommodate double sections lectures for Chem 30A, Chem 1A and Chem 1B; 	?
Facilities: Offices	Additional office space with 4 desk and a table for a new full-time faculty and current adjunct faculty.	?
Facilities: Labs	An additional fully equipped general chemistry lab to allow more offering of Chem 30A, Chem 1A and Chem 1B.	?
Facilities: Other	A classroom with tables and desktops dedicated for tutoring sessions.	?

Resource Category	Description/Justification	Total Estimated Cost
Library: Library materials	None	

Library: Library collections	None	
-------------------------------------	------	--

Resource Category	Description/Justification	Total Estimated Cost
OTHER	None	