



Instructional Programs

2017-2018 Self-Study

Three-Year Program Review

Biology and Health Departments

Natural Sciences Division

Statement of Collaboration

The program faculty listed below collaborated in an open and forthright dialogue to prepare this Self Study. Statements included herein accurately reflect the conclusions and opinions by consensus of the program faculty involved in the self-study.

Participants in the self-study

Maala Allen, Kenneth Collins, Spiridon Dimitratos, David Dorado, Jeffrey Feaster, Gitanjali Nilkanth, Mary Nolan-Riegle, Kimberly Rosales, Jo Wu, Calvin Young, and Gilene Young

Authorization

After the document is complete, it must be signed by the Principal Author, the Department Coordinator, and the Dean prior to submission to the Program Review Committee.

_____	_____	_____	_____
Printed name of Principal Author	Signature	Title	Date
Kenneth P. Collins	_____	_____	_____
Printed name of Department Coordinator	Signature	Title	Date
Richard Hartman	_____	_____	_____
Printed name of Dean	Signature	Title	Date

1.0 Mission and Goals

The College's Mission, Vision, Core Values and Goals drive all college activities. The Program Review committee would like to understand the connection of your program to the College's Mission, Vision, Core Values and Goals. Summarize how your program supports each area.

Mission: The Departments of Biology and Health Education are important components of the mission of Fullerton College. Students in our programs learn to think critically and analyze the world around them. The scientific method promotes inquiry and intellectual curiosity. These principles give students the skills necessary to excel in their career and educational goals. Our degrees and certificates provide a solid foundation for students to continue their educational journey at a transfer institution or enter the workforce.

Vision: We live in an era of unprecedented technological and scientific advances. Our programs transform the lives of science and non-science majors by helping them understand and appreciate the significance of modern discoveries and inspiring them to participate in the future of biology, biotechnology, medicine, and many other related fields.

Core Values: The Biology and Health Education programs at Fullerton College have a long tradition of excellence. In the past century, these programs have provided the academic foundation from which countless numbers of students have gone on to obtain advanced degrees in biology, biochemistry, medicine, and other life science and allied health fields. Additionally, many thousands of general education students have used our courses to broaden their understanding of the natural world and enhance their programs of study.

The core values of Fullerton College are well supported by the Departments of Biology and Health Education. Our curriculum contributes to students respecting and valuing diversity by teaching them the biological mechanisms that create diversity in nature and humans. We are continually updating our curriculum and course topics to include new discoveries and innovative techniques. Science is never static, and as scientists we must continue to grow and learn in our fields of study or we will be left behind. Likewise, we hold our students to high standards of academic growth and expect them to adhere to the standards of integrity and high ethics that are required of a scientist. Finally, we strive to better our world by improving the scientific literacy of its citizens and by promoting the healthful wellbeing of our community.

College Goals: Our departments are working hard to promote student success and reduce the achievement gap. Since our previous program review (2014), we have increased retention and success among male, female, Hispanic, and African-American students. Every semester we provide tutors for both majors and non-majors courses. These tutors are selected from the science student population and have previously demonstrated excellence in the topics they tutor. Some of our tutors are paid through grants awarded to the college and/or individual faculty members such as Dr. Jo Wu. However, some of our student tutors volunteer so that they can gain more experience with a subject and remain current in their fields of study. Additionally, many of our courses have weekly supplemental instruction sessions to assist students and promote their success.

We are constantly interacting with our Fullerton College, North Orange County, and scientific communities. Every year we offer multiple seminars to engage the students, faculty, administration and the general public. We host workshops and STEM field trips to educate and inspire anyone interested in additional experiences in the sciences. Each summer, Dr. Wu runs a series of Science

Summer Camps to reach out to individuals beyond our campus. Additionally, we interact with the scientific community through research publications, invited presentations, and training workshops.

2.0 Program Data & Trends Analysis

2.1 Key Performance Indicators (KPI)

For each KPI listed below, analyze and report your findings and describe what they mean.

(Attach 5-year longitudinal data from Office of Institutional Research and Planning (OIRP) to Appendix.)

KPI	Findings
<u>Enrollment</u> 2012-13 = 2631 2013-14 = 3352 2014-15 = 3398 2015-16 = 3353 2016-17 = 3604	Prop. 30 passed in November 2012 allowing our enrollment to increase by 27% in the 2013-14 academic year. Enrollment then remained steady until 2016-17 when it grew by another 7%. This latest growth is primarily due to optimizing our BIOL 101 lab scheduling to allow more 101 labs to be scheduled each week.
<u>Total FTES</u> 2012-13 = 456 2013-14 = 556 2014-15 = 587 2015-16 = 605 2016-17 = 656	FTES has grown steadily since 2012 despite a 3-year stagnation in enrollment from 2013 to 2016. It is especially interesting that academic years 2013-14 and 2015-16 have nearly identical enrollments, yet the 15-16 year has almost 50 more FTES. This is likely due to the growth of BIOL 101 sections (65% since fall 2014), which is a 5-unit course, and the decreased enrollment in BIOL 102, which is 3 units. So, while we haven't dramatically increased the number of students we serve since 2013, those students are now enrolled in higher unit courses.
<u>Sections</u> 2012-13 = 85 2013-14 = 104 2014-15 = 112 2015-16 = 116 2016-17 = 132	As with FTES, the number of biology sections has grown steadily. This is mostly the result of increasing the number of BIOL 101 sections and the introduction of the Biotechnology Certificate Program in fall 2016.
<u>FTEF</u> 2012-13 = 23.2 2013-14 = 28.1 2014-15 = 29.9 2015-16 = 30.9 2016-17 = 36.2	The department has added four new full-time faculty since 2015 and increased the number of adjunct instructors to meet demand created by new sections of BIOL 101 and biotechnology.
<u>Fill Rate</u> 2012-13 = 99% 2013-14 = 100% 2014-15 = 98% 2015-16 = 98% 2016-17 = 93%	The fill rate in biology courses is extremely high and, despite the dip last year, remains strong with most sections filled to capacity.
<u>WSCH/FTEF</u> 2012-13 = 590 2013-14 = 593 2014-15 = 588 2015-16 = 587 2016-17 = 545	Although WSCH/FTEF has dropped in past five years, it remains well above the statewide standard of 525. The decrease can be explained, at least in part, by the increase in the proportion of BIOL101 sections, which have a class size of 25.
<u>Retention</u> 2012-13 = 75%	Since our previous program review (fall 2014) our retention rate has increased by 5% from 75% to 80%.

2013-14 = 75%	
2014-15 = 77%	
2015-16 = 78%	
2016-17 = 80%	
<u>Success</u>	
2012-13 = 60%	Since our previous program review (fall 2014) our student success rate has increased by 5% from 57% to 62%.
2013-14 = 57%	
2014-15 = 61%	
2015-16 = 62%	
2016-17 = 62%	

2.2 Peer Institution Comparison

Complete the table below. (used data from Sum. 16, Fall 16, Spr. 17)

College/Program:	Fullerton College	Chaffey College	Glendale College	Riverside Comm. College	Santa Ana College
Retention:	80%	90%	77%	71%	82%
Success:	61%	64%	67%	49%	65%
Degrees Awarded:	25	9	7	0	0
Certificates Awarded:	0	0	0	0	0

How does your program compare with peer institutions? Provide a narrative of your comparison. (Peer institutions are colleges or programs identified by the Office of Institutional Research and Planning (OIRP)).

The retention and success rates for students in the Biology Department are on par with three out of the four peer institutions. The Chaffey College retention rate and the Riverside Community College success rate are outliers. Although Chaffey had a substantially higher retention rate, their success rate was comparable. Riverside Community College had lower retention and success rates than any of the other peer institutions. The FC Biology Department awarded more degrees than the peer institutions.

2.3 Achievement Gap

Indicate achievement gap for each of the groups listed below. (Attach to Appendix the Success and Retention by Ethnicity Data as identified by the Office of Institutional Research and Planning.)

Group	% Retention (Change from last PR)	% Success (Change from last PR)
Males	80% (+5%)	64% (+5%)
Females	79% (+4%)	61% (+6%)
Asian-American	81% (+4%)	69% (+4%)
African-American	81% (+5%)	62% (+13%)
Filipino	80% (-1%)	63% (-2%)
Hispanic	78% (+7%)	56% (+6%)
Native American	100% (+21%)	91% (+38%)
Two or More	80%	62%
Pacific Islander	56% (-36%)	56% (-21%)
White	84% (+4%)	72% (+9%)
Unknown	77% (-1%)	60% (-5%)

Range (Max-Min)	44%	35%
------------------------	-----	-----

2.4 Program Effectiveness

Since your previous Program Review Self-Study, what significant changes have occurred that impact the effectiveness of your program?

Since our 2014 Program Review the following items have benefitted our program:

- Completion of the Biology AS-T degree (pending State approval)
- Implementation of a new Biotechnology Program
- Increased focus on undergraduate research opportunities
- Increased number of Biology course sections (especially high-demand BIOL 101)
- Addition of four new full-time faculty members
- Acquisition of new lab equipment (microscopes, biotech, etc.)
- Hiring of a dedicated STEM counselor in Counseling Department
- Implementation of biannual Biology Majors Mixers
- New FC STEM and FC Biotechnology websites
- New Biology and Biotechnology Program Brochures

2.5 Describe any laws, regulations, trends, policies, procedures or other influences that have an impact on the effectiveness of your program. Please include any other data (internal or external) that may be relevant to student achievement, learning, and trends within your Basic Skills, CTE, or Transfer Education programs.

The following table shows the projected growth in life science related occupations (2016-2026) as projected by U.S. Bureau of Labor Statistics.

Occupation	Growth
Biochemist	11%
Biological Technician	10%
Conservation Scientist	6%
Environmental Science Technician	12%
Environmental Scientist	11%
Forensic Science Technician	17%
Zoology and Wildlife Biology	8%

We continue to see high demand for our major courses and our space restrictions continue to be a challenge for the department. The projected demand for biological scientists mirrors the projected employment trends in other STEM majors as well. As more students choose STEM majors, it becomes more challenging to provide them with adequate support as they navigate their way through Fullerton College. We have identified a STEM Resource Center and additional laboratory space as the first steps to providing such support.

2.6 Provide any other data that is relevant to your self-study.

N/A

3.0 Strengths, Weaknesses, Opportunities, Challenges (SWOC)

Based on your analysis in 2.1 through 2.6, answer the following questions:

3.1 What are the strengths of your program?

The Biology Department continues to offer challenging non-majors and majors courses that are in high demand. Due to this high demand, we have expanded our offerings to full capacity. There was a 6% increase in enrollment and over an 11% increase in total FTES from 2014-15 to 2016-17. Even though 28 new sections were offered from 2014-15 to 2016-17, the fill rate continues to remain at over 90% and retention increased from 77% to 80%. A new three-tiered Biotechnology certificate program was created and nine new Biotechnology classes have been added to teach students skills and techniques that will make them marketable, as the industry in Southern California is demanding expertise in this area. The Biotech team has been very successful at obtaining additional resources to facilitate the growth of the program including Perkins funding and \$271,000 Strong Workforce award.

The faculty is one of the greatest strengths of our program. As a group, the faculty has expertise in all the important content areas in biology and biotechnology. This is important to our students as they explore different academic and career opportunities in biology. Our interaction with our students is one of our top priorities. Impromptu, informal mentoring and tutoring sessions are a common occurrence in the 400 building. These interactions help support student success. To enhance faculty-student interaction, the Biology Department held a Biology mixer at the beginning of Fall 2017 and introduced a new Biology brochure that clearly lays out the pathway needed to obtain an AA or AS-T degree and transfer to a 4-year institution. A STEM website was created and a full-time STEM counselor was hired to formally advise students on transfer and career opportunities. The faculty continue to be mentors and provide informal advisement for our students. The Biology Department continues to invest in a High School Outreach Program that draws students to Fullerton College in general, and as Biology majors specifically.

The Biology Department also supports the Natural Science Division's involvement in Project Raise, which provides undergraduate research opportunities to students to conduct scientific research with a faculty member at Cal State Fullerton over the summer. Some biology faculty attended a 10-day course on ant biology at the Southwest Research Station in Portal, AZ and are currently maintaining thriving ant colonies. These colonies will be used in student research projects investigating various factors affecting indigenous ant colonies.

3.2. What are the weaknesses of your program?

3.2.1 Limited resources for adding sections. Although the department has greatly increased the number of sections in high demand courses, there is still high unmet demand for additional sections. However, our ability to add additional sections is hampered due to space limitations. We have added the additional sections by maximizing room use efficiency, including evenings and Saturdays. However, there is limited or no support for our laboratory classes during these times.

3.2.2 Limited resources for providing additional student support. Although our retention and success rates have risen over the past review period, we still see room for improvement. With the rigorous coursework, we would like to provide more support and instruction in the form of Supplemental Instruction (SI), tutoring, and mentoring. Some instructors have taken advantage of the institutional SI program to provide this for their students. Other faculty have taken it upon themselves to schedule instructor-run sessions. This effort, however, is very difficult given the

dearth of available facilities within the 400 building. As well, it is difficult to coordinate these efforts between different faculty members, which could serve to maximize the impact for our time.

3.2.3 Coordination of internships. As stated above, the faculty, as a whole, have very strong research backgrounds. We are making the effort to provide research opportunities for our students. This has taken two forms. The first avenue is facilitating internships with local businesses dealing with different aspects of biology. This has grown into a successful, but Herculean, effort. Much of the coordination of these interns has fallen on Dr. Jo Wu, but it has grown beyond what Dr. Wu can easily handle, given her accompanying teaching load.

3.2.4 Facilities for research opportunities. The second avenue is providing research projects within the college itself. These research projects have yielded some impressive results (several poster presentations and talks at local science meetings) but have never been easily sustainable. We have received funding through PBSC to expand these opportunities and have chosen to center several future research projects on ant species indigenous to the southwestern United States. Although the funding covers much of what is required to initiate these projects, we are still faced with space issues. There is the need for a facility that can accommodate the colonies, work areas, and student space.

3.2.5 Faculty staffing issues. As stated above, the combined expertise of the faculty covers most of the major areas of biology. However, in some areas, there is only a single faculty expert. With the expected retirement of at least two full-time faculty members within the current program review cycle, this will put the department in a difficult predicament.

3.3 What opportunities exist for your program?

The department continues to be part of the Orange County Biotechnology Education Partnership, a collaboration with Santiago Canyon College, Santa Ana College, Irvine Valley College, and local industry leaders. The consortium advisory board continues to meet and provides guidance and advice for the consortium colleges on the coursework and practical skills that will make our students highly competitive in the biotech job market, both locally and globally. Although the current curriculum is evenly parsed among the participating colleges, there may be opportunities for Fullerton College to expand its leadership role in this consortium. With our faculty strength in this area, we are well situated to do so.

As documented in Section 2.5, many life science occupations are expected to experience significant demand and growth in the coming years and beyond. Much of the foundation for these occupations is found in our current courses. We see the opportunity to further develop relationships with employers in these areas to help our students be more competitive in these burgeoning job markets.

3.4 What challenges exist for your program?

Since there was a 6% increase in enrollment and a more than 11% increase in total FTES along with 28 new sections that were offered from 2014-15 to 2016-17, space continues to be a major challenge the biology department faces. The number of large lecture rooms which can accommodate large lecture-only classes are limited. Lecture-laboratory combination classes are limited by laboratory space availability and the need for staff to support these classes. Also, the lack of support staff during evening and weekend hours makes offering classes during these non-traditional times a challenge.

The ratio of Weekly Student Contact Hours per Full-Time Equivalent Faculty (WSCH/ FTEF) has gone down from 588 to 544 but is still higher than the state-recommended 525 hours, which indicates that the department is in need of additional full-time faculty. The existing number of full-time faculty in the department does not cover all of the courses taught. To add to this challenge, two full-time faculty will be retiring at the end of this academic year, putting further strain on the department and compromising faculty availability to students outside the classroom, which in turn could negatively impact student success.

4.0 Student Learning Outcomes (SLO) Assessment

4.1 List your program level SLOs and complete the expandable table below.

	Program Student Learning Outcomes (PSLOs)	Date Assessment Completed	Date(s) Data Analyzed	Date(s) Data Used For Improvement	Number of Cycles Completed
1.	Upon completion of courses leading to the Biology A.A., students will be able to demonstrate an understanding of how the scientific method is used to explore topics in biology.	Fall 2014-Spring 2017	Continuously during cycle	Fall 2017	This is 1 cycle
2.	Upon completion of courses leading to the Biology A.A., students will be able to demonstrate safe and proficient use of laboratory equipment and techniques.	Fall 2014-Spring 2017	Continuously during cycle	Fall 2017	This is 1 cycle
3.	Upon completion of courses leading to the Biology A.A., students will be able to explain the significance of evolutionary theory and how it relates to life on Earth.	Fall 2014-Spring 2017	Continuously during cycle	Fall 2017	This is 1 cycle

4.2 Assessment: Complete the expandable table below.

<i>Program Student Learning Outcomes Assessment for Instructional Programs at Fullerton College</i>			
Intended Outcomes	Means of Assessment & Criteria for Success	Summary of Data Collected	Use of Results
1. Students will be able to demonstrate an understanding of how the scientific method is used to explore topics in biology.	Assessed using CSLOs. Common questions on exams. Criteria: 70%	82% of assessed students demonstrated proficiency. Previous self-study (2014) had 100% success, but the sample size was very small.	Satisfactory. Instruction on the application of scientific method is a major focus of courses in the major.
2. Students will be able to demonstrate safe and proficient use of laboratory equipment and techniques.	Assessed using CSLOs. Includes skills assessments with microscopes, sample collections, etc. Criteria: 70%	86% of assessed students demonstrated proficiency. This is a slight improvement from the 2014 result of 83%.	The faculty are satisfied that our instructional methods work well regarding lab safety and equipment usage. Introduction of new equipment will be dealt with on a case by case basis.
3. Students will be able to explain the significance of evolutionary theory and how it relates to life on Earth.	Assessed using CSLOs. Common questions on exams, including lab practical exams. Criteria: 70%	66% of assessed students demonstrated proficiency. This is a decrease from the 2014 result of 83%, although the sample size at that time was quite small.	Faculty have revised in-class and out-of-class activities that support evolutionary theory concepts, and have increased student feedback to try to improve proficiency.

4.3 What percentage of your program level SLOs have ongoing assessment? Comment on progress/lack of progress.

100% of our PSLOs have ongoing assessment. Results of CSLOs are discussed periodically at Biology Dept. meetings. See attached minutes from the 01/27/17 meeting.

4.4 How has assessment of program level SLOs led to improvements in student learning and achievement?

PSLO #3 (evolutionary theory) illustrates a challenging topic for our major and non-major (BIOL 101) students alike. This topic has been extensively discussed by department faculty in relation to BIOL 101. Please see attached minutes from the 01/27/17 meeting. The faculty in BIOL 101 have modified their approach to teaching evolution, providing more clear-cut examples of Darwinian evolution, and using a computer-based lab exercise to re-enforce the Darwinian model. These same techniques – should they help improve student learning regarding evolution – would also work for our Biology AA/AS-track students.

4.5 How has assessment of program-level SLOs led to improvements in transfer or certificate/degree awards?

The completion of a Biology AA degree is not the primary aim of the majority of our majors students. They are mostly interested in transfer to a four-year institution to complete a Bachelor's degree, and possibly enter a graduate or professional school. The newly created Biology Degree for Transfer (Biology AS-T) will most likely increase the number of degrees awarded during the next cycle. The three PSLOs (and the CSLOs they are based on) do represent an important subset of the skills, analytical abilities, and conceptual understanding required to be a successful biology transfer student, and therefore will continue to be utilized to help improve our instruction.

4.6 What challenges remain to make your program level SLOs more effective?

This is the first self-study cycle to utilize eLumen for CSLO/PSLO analysis. Department faculty are still learning to utilize its full potential, and discovering more about what is and is not working in our courses.

This Program Review template was created when the campus used a paper-based system to track CSLO/PSLO performance. Perhaps the Program Review Committee could take a look at modifying Section 4 to more directly link to eLumen reports.

5.0 Evaluation of Progress Toward Previous SAP's

5.1 List the goals from your last self-study/program review.

SAP#1: Create a Campus STEM Resource Center

SAP#2: Grow the number of biology sections offered by increasing laboratory space

SAP#3: Create a Biotechnology and Bioscience certificate program

SAP#4: Increase opportunities for students to experience science through research, internships, field trips, etc.

SAP#5: Repair and Restore the Native Plant Garden, water feature and greenhouse

SAP#6: Develop a new AS-T degree in biology and add a new full-time faculty member

SAP#7: Increase the mentoring role of faculty with our biology major students

5.2 Describe the level of success and/or progress achieved in the goals listed above.

SAP#1: Create a Campus STEM Resource Center

No progress has been made towards creating a Campus STEM Resource Center with a full-time director. Fullerton College did hire a full-time STEM counselor in Fall 2016 who works out of the Counseling Department. A detailed and comprehensive STEM website has been created, providing information to students on mentoring, research opportunities, peer-assisted learning, seminars, and workshops.

Because we believe that the success of our majors students can be increased through mentoring, undergraduate research, and fostering a sense of belonging to a community of scientists, the faculty have taken on some of the duties of the proposed STEM director on an *ad hoc* basis. For example, biology faculty continue to advise and mentor students, assist them with identifying research and scholarship opportunities, and review their applications. This semester we held our first Biology Majors Mixer, which was well attended. We invited former students who are at various stages of their academic and professional development to speak to our majors students about steps they can take to increase their success here at Fullerton College and after they transfer. Students had the opportunity to personally meet the biology faculty and learn about their academic paths and research interests. We anticipate that our majors students will feel more comfortable seeking advice from faculty they have already met. We have also developed a mailing list for biology majors which has increased our ability to inform students of the types of opportunities and events discussed above.

SAP#2: Grow the number of biology sections offered by increasing laboratory space

Our proposal to increase lab space for biology sections was dependent on creating portable lab space for the new courses in the Biotechnology Certificate Program and for Cellular and Molecular Biology (Bio 272). No new lab space was created but the use of existing space has been optimized. The number of biology sections has increased from 104 sections during the 2013-2014 academic year to 132 sections in 2016-2017. This has been achieved by adding more evening and weekend sections and by decreasing the amount of time between labs to only ten minutes in many cases. Because of the short transition time between labs, it is often difficult for our lab support staff to set up all of the equipment and supplies for each lab before the class begins. Although we have added several new sections of Biology 101, the course always fills very quickly indicating there is still unmet demand. We will only be able to meet this demand if we are able to secure additional lab space.

SAP#3: Create a Biotechnology and Bioscience certificate program

A three-tier stackable Biotechnology certificate program was developed, with the input of a regional Biotechnology Advisory Committee that met annually in 2012-2015, to provide new students and incumbent workers with skills to enter and advance in this growing industry. The certificate series comprises a of courses that are a blend of skills-intensive biotechnology courses and UC/CSU transferable courses, some of which are required of biology majors. This blend will allow students who are job-oriented to acquire skills and theory-based knowledge needed to enter a growing and high-wage field, but also take courses that be applied to a science/biology degree should they decide to pursue more education.

The major goal of the Biotechnology certificate series is to provide students with information and skills that will provide employment and advancement opportunities in the biotechnology sector, which includes many industries, from food processing to research and development medical device manufacturing. There are three tiers to the stackable certificates.

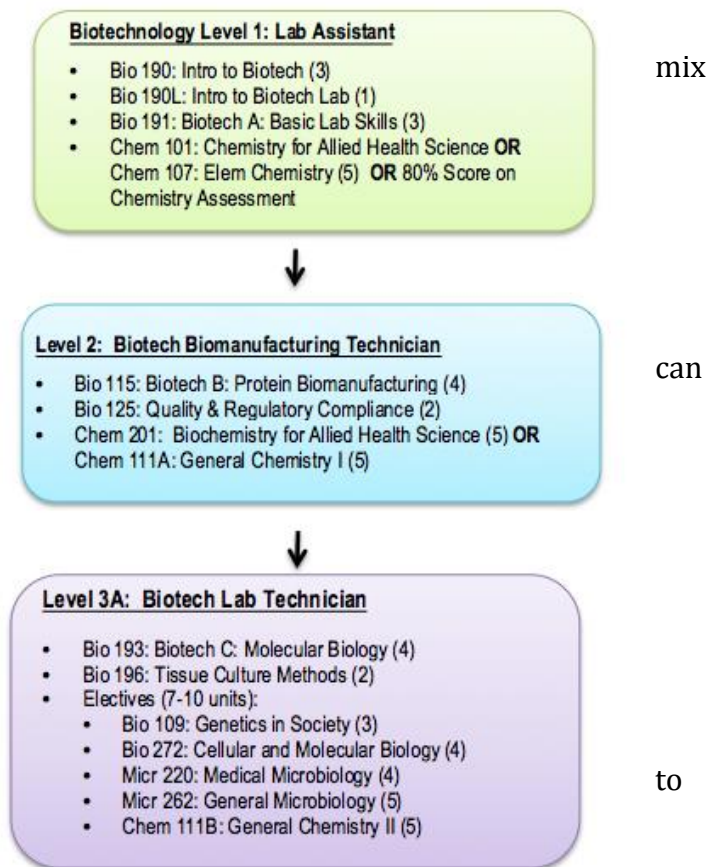
The first level provides an overview of the industry, basic laboratory skills and related theory. The second level focuses on protein-related work and quality control. The third level provides training in the booming field of nucleic acids but also allows the students flexibility in choosing courses that align best with their interests and opportunities in the industry.

The new Biotechnology courses that have been developed and approved are:

- BIOL 190: Introduction to Biotechnology
- BIOL 190L: Introduction to Biotechnology Lab
- BIOL 191: Biotech A: Basic Lab Skills
- BIOL 192: Biotech B: Protein Biochemistry
- BIOL 193: Biotech C: Molecular Biology
- BIOL 194: Quality and Regulatory Compliance in the Biosciences
- BIOL 196: Tissue Culture Methods

SAP#4: Increase opportunities for students to experience science through research, internships, field trips, etc.

We have provided numerous experiential opportunities for FC students, including field trips to industry sites, hands-on skill-building workshops, and multiple research projects. In the past three years, we have hosted Saturday biotech skills workshops for 495 students. Past research projects conducted on weekends (when lab rooms were available) have included DNA barcoding



of sushi, DNA testing of organic vegetables and pet food, and searching for new anti-microbial agents.

Last year we were awarded \$51,500 by PBSC to further build our undergraduate research program. After discussion and planning by our department, we have chosen to develop an ongoing study of the ecology, behavior, and genetics of California native ants. In preparation for the project, two Biology Department faculty members attended a 10-day course on ant biology at the Southwest Research Station in Portal, Arizona. We are currently in the process of identifying and selecting biology majors who are interested in participating in an ant ecology project we have initiated with the Puente Hills Habitat Authority.

SAP#5: Repair and Restore the Native Plant Garden, water feature and greenhouse

The Native Plant Garden and greenhouse remain in a state of disrepair despite their potential to have a positive impact on our courses and student development.

SAP#6: Develop a new AS-T degree in biology and add a new full-time faculty member

We have completed the curriculum process for our AS-T degree in Biology and it is currently waiting for state approval. Our original intent was to change our core curriculum so that Cellular & Molecular Biology would be the first class in the biology sequence. However, because Chemistry 107 and 111A are pre-requisites for Cellular & Molecular Biology, students would not have been able to take any biology majors courses until their second year at Fullerton. In order to facilitate the transfer process for our students, we decided to keep Organismal Biology as the first class in the biology sequence. This enables our students to take two of their biology majors classes (Organismal Biology and Ecology) while taking their chemistry pre-requisites for Cellular and Molecular Biology.

We hired four new faculty in 2015 and 2016. This was a net gain of two faculty in our department because we had one retirement and one resignation. Dr. Gitanjali Nilkanth and Dr. Gilene Young teach Biology 101 and Organismal Biology, while Dr. Kimberly Rosales and Dr. Spiridon Dimitratos teach Biology 101 and the new biotechnology courses. The addition of new faculty in our department has allowed us to add the new sections mentioned above.

SAP#7: Increase the mentoring role of faculty with our biology major students

Biology major students were encouraged in science courses and by STEM counselors to meet faculty mentors during office hours. During the past few years, STEM mixers have been hosted every semester to introduce students to the many resources and faculty mentors available to science students. A handout explaining the specialty and experience of each biology faculty member were provided at the recent Biology Majors mixer. In the first majors biology course, Organismal Biology, instructors discuss the course requirements for transfer as a biology major to the different UC and CSU institutions. Students are encouraged to meet individually with professors to discuss their individual pathways, and many do so. All biology major students also take the Cellular and Molecular Biology course, and are mentored by Jo Wu about scientific resumes, internships, scholarships, educational pathways and careers. Students are directed to other faculty with expertise in specific biological fields.

5.3 How did you measure the level of success and/or progress achieved in the goals listed above?

SAP#1: Create a Campus STEM Resource Center

While we were able to accomplish some of the proposed functions of a STEM Resource Center, progress has been very limited. The long-term success of this goal will depend on the college's commitment to STEM education and the funding of a resource center.

SAP#2: Grow the number of biology sections offered by increasing laboratory space

We can measure the level of success at increasing the number of biology sections offered by the 27% increase in sections offered in just three years. With careful logistical placement, we arranged for more lab classes to be offered throughout the week from 7:30 am to 10 pm. In our last program review we stated that some of the increase would come from offering the new biotechnology courses. We started teaching these courses in Fall 2016, and we currently teach three or four Biotechnology courses per semester. We also taught two Biotechnology courses during the summer.

SAP#3: Create a Biotechnology and Bioscience certificate program

Success has been measured by the approval of three Biotechnology certificate programs since our last program review. Ultimately, success is measured by students completing our programs. Eleven students have completed the first Biotechnology Lab Skills Certificate and eight students were awarded the AS Biological Technician degrees during the past two years.

SAP#4: Increase opportunities for students to experience science through research, internships, field trips, etc.

FC students have developed skills to be marketable for industry jobs and competitive paid research internships at major universities nationwide. During the last decade, we have had 90 FC students obtain university research internships, 17 biotech industry jobs, 42 local science lab jobs and 17 science tutoring jobs.

SAP#5: Repair and Restore the Native Plant Garden, water feature and greenhouse

N/A

SAP#6: Develop a new AS-T degree in biology and add a new full-time faculty member

We can measure our level of success at meeting this goal by the completion of the curriculum for the AS-T degree in biology, and the hiring of new faculty members.

SAP#7: Increase the mentoring role of faculty with our biology major students

We can measure our level of success by the increased number of biology major students that come for mentoring. The online appointment scheduling provides some data about the number of mentoring appointments. Jo Wu keeps personal notes about each individual mentoring system, but we have not kept coordinated files in the department.

5.4 Provide examples of how the goals in the last cycle contributed to the continuous quality improvement of your program.

SAP#1: Create a Campus STEM Resource Center

Although there was no creation of a STEM Resource Center, the extra duties taken on by the faculty in the absence of a STEM director have allowed many of our biology majors students to find undergraduate research positions, scholarships, and transfer opportunities, and to gain a sense of being part of a STEM community.

SAP#2: Grow the number of biology sections offered by increasing laboratory space

The addition of approximately 28 new sections overall allowed us to serve many more non-majors, majors, and biotechnology certificate students, thus increasing transfer rate.

SAP#3: Create a Biotechnology and Bioscience certificate program

The Biotechnology program is filling a need to supply trained technicians for Orange County's growing biotech industry. The program has increased our visibility and exposure with both industry and other academic programs in the area.

SAP#4: Increase opportunities for students to experience science through research, internships, field trips, etc.

We were fortunate to have external grants and internal funding to support research projects, teaching assistants and faculty mentors. We will continue to host our own research projects as well as maintain close collaborations with the regional universities and industry companies.

SAP#5: Repair and Restore the Native Plant Garden, water feature and greenhouse

N/A

SAP#6: Develop a new AS-T degree in biology and add a new full-time faculty member

Once the new AS-T degree is approved we should see an increase in the number of degrees and certificates awarded and an increase in the number of transfers.

SAP#7: Increase the mentoring role of faculty with our biology major students

The mentoring may have led to an increase in numbers of students applying and attaining research internships and science-related jobs. As mentioned before, many FC students have been awarded summer research internships at universities such as Harvard, Stanford, Cornell, Columbia, UCLA, UCI, UCSD, and more.

5.5 In cases where resources were allocated toward goals in the last cycle, how did the resources contribute to the improvement of the program?

SAP#1: Create a Campus STEM Resource Center

N/A

SAP#2: Grow the number of biology sections offered by increasing laboratory space

N/A

SAP#3: Create a Biotechnology and Bioscience certificate program

No program review funds were used. The new Biotechnology curriculum and certificate program were developed with close collaboration between faculty from four community colleges (OC Biotech Education Partnership), who meet every month.

SAP#4: Increase opportunities for students to experience science through research, internships, field trips, etc.

With the program review funding, faculty Ken Collins and Jeff Feaster have developed a new research project to study the behavior and ecology of a California native ant species. Spiros Dimitratos, Kim Rosales, and Jo Wu will supervise molecular biology research projects.

SAP#5: Repair and Restore the Native Plant Garden, water feature and greenhouse
N/A

SAP#6: Develop a new AS-T degree in biology and add a new full-time faculty member
The hiring of new faculty was essential to our ability to offer more sections of BIOL 170, thus increasing the number of transfers and degrees awarded.

SAP#7: Increase the mentoring role of faculty with our biology major students
N/A

5.6 If funds were not allocated in the last review cycle, how did it impact your program?

SAP#1: Create a Campus STEM Resource Center

The lack of funds for a STEM Resource Center and Director prevented our students from receiving the highest possible level of assistance in finding undergraduate research opportunities and scholarships. A STEM director would have also enhanced our liaison with CSU and UC STEM departments, thus potentially increasing our transfer rate. If the college funds a STEM Resource Center in the future, we will also be able to strengthen our partnerships with the biotechnology industry, thus increasing recruitment, success, and internship opportunities for the students in our new Biotechnology certificate program.

SAP#2: Grow the number of biology sections offered by increasing laboratory space

As we did not receive funding for new lab space, we have been unable to meet the demand for our courses. Our BIOL 272 (Cellular & Molecular Biology) course sections are now sharing one lab room with our biotechnology certificate courses due to the lack of additional lab space. If our request for additional lab space had been funded, we would have been able to move the BIOL 272 and biotechnology courses to this new space, thus freeing up another lab room to offer 15 new sections of BIOL 101.

SAP#3: Create a Biotechnology and Bioscience certificate program
N/A

SAP#4: Increase opportunities for students to experience science through research, internships, field trips, etc.
N/A

SAP#5: Repair and Restore the Native Plant Garden, water feature and greenhouse

The General Ecology course (BIOL 274) could use the Native Plant Garden area extensively if it were repaired, pruned, and cleaned up. For many years we have planned to use the restored water feature to establish a population of mosquitofish for training students to use a capture-recapture technique for estimating population size. Instead, for many years, we have had to teach the technique in the classroom using buckets of beads. While the principle is still learned by the students, the impact is diminished by artificiality of the process. Additionally, the ecology course could use the native plants to teach students about adaptations to climate if the density of the vegetation was reduced to allow better access by students.

As we worked to develop our undergraduate research project on native ants we have run into serious space constraints. Our lab spaces are occupied most of the day and our stockroom has limited space to support our research colonies. The former aquaculture lab associated with the

Native Plant Garden would make an ideal location for setting up a research space where students could work with ant colonies and process specimens collected from field sites.

SAP#6: Develop a new AS-T degree in biology and add a new full-time faculty member
N/A

SAP#7: Increase the mentoring role of faculty with our biology major students
We will continue to do faculty mentoring, regardless of funding.

6.0 Strategic Action Plans (SAP)

Using the tables below, list the strategic action plans (SAPs) for your program. These plans should follow logically from the information provided in the self-study. Use a separate table for each SAP.

SAPs for this three-year cycle:

STRATEGIC ACTION PLAN # 1	
Describe Strategic Action Plan: (formerly called short-term goal)	Create a Campus STEM Resource Center.
List College goal/objective the plan meets:	<p>College Goal #1: Fullerton College will increase student success Objective #1: Address the needs of under-prepared students. Objective #2: Increase course retention and success. Objective #3: Increase the number of degrees and certificates awarded. Objective #4: Increase the number of transfers. Objective #5: Increase the number of students participating in STEM activities. Objective #6: Increase the persistence rate of students.</p> <p>College Goal #2: Fullerton College will reduce the achievement gap. Objective #2: Increase retention rate of Hispanic and African-American students by at least 2%. Objective #3: Increase success rate of Hispanic and African-American students by at least 2%. Objective #4: Increase persistence rate of Hispanic and African-American students by at least 2%. Objective #5: Increase the number of students from underrepresented groups participating in STEM activities.</p> <p>College Goal #3: Fullerton College will strengthen connections with the community. Objective #1: Strengthen our contacts with Alumni. Objective #2: Strengthen partnerships with local feeder high schools and universities. Objective #3: Strengthen partnerships with local business and industry. Objective #4: Increase funding capabilities of the college. Objective #5: Increase engagement of the college with the community through college events, community service, and other partnerships.</p>
Describe the SAP: (Include persons responsible and timeframe.)	The proposed Campus STEM Resource Center will require a full-time classified staff member to run the Center, and suitable facilities to house it. There are several possible locations for the Center, which include the land adjacent to the native plant garden and the former Math Lab in the 600 building. The director of the Center would have the following duties:

	<ul style="list-style-type: none"> • Identify STEM majors and develop database for tracking • Develop contact folder and meet with STEM majors once a semester • Identify and recruit potential majors • Assist STEM majors with educational plan, resume, and statement of purpose • Coordinate with Institutional Research and Basic Skills offices to identify trends and opportunities • Match STEM majors with faculty mentors for increasing connectivity to college • Identify scholarship, internship, and employment opportunities in STEM fields • Develop “environmental scan” (job market) in LA/OC • Identify, promote, and assist undergraduate research opportunities • Assist STEM majors with applications for scholarships and internships • Update STEM calendar of events • Develop/Maintain/Update STEM website • Manage STEM tutors hiring/scheduling • Assist with tutoring and supplemental instruction • Develop and assist with STEM-experience activities • Act as liaison between STEM programs • Act as liaison with CSU/UC STEM departments • Coordinate STEM seminar series • Develop funding opportunities for STEM • Communicate/market STEM programs to campus and community • This addresses Weaknesses 3.2.1, 3.2.2, and 3.2.3 • Persons Responsible: Department Coordinator, Division Dean, Vice President of Instruction, College President • Timeframe: Within this Program Review cycle
<p>What <i>Measurable Outcome</i> is anticipated for this SAP?</p>	<ul style="list-style-type: none"> • Increased number of STEM degrees/certificates • Increased number of STEM majors transferring • Increased recruitment of underrepresented groups to STEM majors • Increased success rate of STEM students • Increased persistence and retention of STEM students • Increased number of students attending tutoring and SI sessions • Creation of a STEM Alumni Network • Increased placement of students in research and internship programs • Increased opportunities for students to participate in community service • Increase the amount of grant money to support

	<p>student/faculty research opportunities</p> <ul style="list-style-type: none"> • Greater connectivity and partnerships with area STEM industries • More interdisciplinary coordination among STEM departments
What specific aspects of this SAP can be accomplished without additional financial resources?	This plan is highly dependent on funding and facilities.

If additional financial resources would be required to accomplish this SAP, please complete the section below. Keep in mind that requests for resources must follow logically from the information provided in this self-study.

Type of Resource	Requested Dollar Amount	Potential Funding Source
Personnel	\$87,000/yr. ongoing	General Fund
Facilities	\$150,000	Measure J Bond or Carryover
Equipment	\$10,000	Instructional Equipment Funds
Supplies	0	
Computer Hardware	\$3,000	Instructional Equipment Funds
Computer Software	0	
Training	0	
Other	0	
Total Requested Amount	\$250,000	

STRATEGIC ACTION PLAN # 2	
Describe Strategic Action Plan: (formerly called short-term goal)	Update Bioscience A.S. degree program and create a 4th Biotechnology certificate.
List College goal/objective the plan meets:	<p>College Goal #1: Fullerton College will increase student success</p> <p>Objective #3: Increase the number of degrees and certificates awarded.</p> <p>College Goal #3: Fullerton College will strengthen connections with the community.</p> <p>Objective #2: Strengthen partnerships with local feeder high schools and universities.</p> <p>Objective #3: Strengthen partnerships with local business and industry.</p> <p>Objective #4: Increase funding capabilities of the college.</p> <p>Objective #5: Increase engagement of the college with the community through college events, community service, and other partnerships.</p>
Describe the SAP:	<ul style="list-style-type: none"> • We will revise the AS degree requirements for better

(Include persons responsible and timeframe.)	<p>articulation with the Biotechnology Bachelor degrees currently offered at two California community colleges.</p> <ul style="list-style-type: none"> • We are developing a new Biotech Research and Development Certificate, which would include new courses in research skills, science seminars and STEM internships. • This SAP addresses Weaknesses 3.2.3 and 3.2.4 • Persons Responsible: Jo Wu, Kim Rosales, Spiros Dimitratos • Timeframe: Within one year
What <i>Measurable Outcome</i> is anticipated for this SAP?	<ul style="list-style-type: none"> • Increase the number of students in Biotechnology and Bioscience jobs • Increase the number of Biological Technician degrees and Biotechnology certificates • Increase the number of industry and academic partners
What specific aspects of this SAP can be accomplished without additional financial resources?	<ul style="list-style-type: none"> • Develop new certificate program • Revise current curriculum • Propose new curriculum

If additional financial resources would be required to accomplish this SAP, please complete the section below. Keep in mind that requests for resources must follow logically from the information provided in this self-study.

Type of Resource	Requested Dollar Amount	Potential Funding Source
Personnel		
Facilities		
Equipment		
Supplies		
Computer Hardware		
Computer Software		
Training		
Other		
Total Requested Amount		

STRATEGIC ACTION PLAN # 3	
Describe Strategic Action Plan: (formerly called short-term goal)	Increase opportunities for students to experience science through research, internships, field trips, etc.
List College goal/objective the plan meets:	<p>College Goal #1: Fullerton College will promote student success.</p> <p><u>Objective #1:</u> Address the needs of under-prepared students.</p> <p><u>Objective #2:</u> Increase course retention and success.</p> <p><u>Objective #3:</u> Increase the number of degrees and certificates awarded.</p> <p><u>Objective #4:</u> Increase the number of transfers.</p>

	<p><u>Objective #5</u>: Increase the number of students participating in STEM activities.</p> <p><u>Objective #6</u>: Increase the persistence rate of students.</p> <p>College Goal #2: Fullerton College will reduce the achievement gap.</p> <p><u>Objective #2</u>: Increase retention rate of Hispanic and African-American students by at least 2%.</p> <p><u>Objective #3</u>: Increase success rate of Hispanic and African-American students by at least 2%.</p> <p><u>Objective #4</u>: Increase persistence rate of Hispanic and African-American students by at least 2%.</p> <p><u>Objective #5</u>: Increase the number of students from underrepresented groups participating in STEM activities.</p> <p>College Goal #3: Fullerton College will strengthen connections with the community.</p> <p><u>Objective #3</u>: Strengthen partnerships with local business and industry.</p> <p><u>Objective #4</u>: Increase funding capabilities of the college.</p> <p><u>Objective #5</u>: Increase engagement of the college with the community through college events, community service, and other partnerships.</p>
<p>Describe the SAP: (Include persons responsible and timeframe.)</p>	<ul style="list-style-type: none"> • We will offer research opportunities in the life science that will provide students with training that is not normally available at community colleges. • We will seek out and form new partnerships with local life science and health industries to provide internship opportunities for our students. • As a capstone to their research and internships, students will participate in the annual Natural Sciences Undergraduate Research Symposium, and may submit posters for presentation at scientific conferences in Southern California, including the Southern California Conference for Undergraduate Research, and the Southern California Academy of Sciences annual meeting. • By offering students an opportunity to jumpstart their scientific careers, we hope to attract a greater number of majors, increase the number of Biology degrees attained, and increase the number of transfers from our department to four-year institutions. • The proposed Campus STEM Resource Center (see SAP #1) will help coordinate research and internship opportunities. • Increasing field research opportunities will require an additional two support vehicles to replace #402 (which is being retired by the motor pool) and reduce competition for use of the current van fleet. • We will need an additional supply budget to accommodate the increased number of students at the Undergraduate Research Symposium • Current PBSC funding will be exhausted after 2018-19 academic

	<p>year</p> <ul style="list-style-type: none"> • This SAP addresses Weakness 3.2.4 • Persons Responsible: Ken Collins, Jeff Feaster, Jo Wu • Timeframe: Ongoing
What <i>Measurable Outcome</i> is anticipated for this SAP?	<ul style="list-style-type: none"> • Increased course retention and success in Biology major courses • Increased number of degrees and certificates awarded • Increased number of transfers • Increased persistence rate of major students • Increased retention, success, and persistence of Hispanic and African-American majors • Partnerships with local business and industry • Increased funding capabilities of the college.
What specific aspects of this SAP can be accomplished without additional financial resources?	We are carrying over some research funding allocated by PBSC last year. This will fund <u>some</u> research, internships, and field trip opportunities through the 2018-19 academic year. However, we can increase the effectiveness of the previously allocated funds by acquiring the vans requested below and by funding the Campus STEM Resource Center (SAP #1). We also need a two-year extension on our research funding to ensure money is available through fall 2020 (the next Program Review Cycle)

If additional financial resources would be required to accomplish this SAP, please complete the section below. Keep in mind that requests for resources must follow logically from the information provided in this self-study.

Type of Resource	Requested Dollar Amount	Potential Funding Source
Personnel	\$10,000 (student hourly)	PBSC
Facilities		
Equipment	\$40,000	PBSC
Supplies	\$10,000	PBSC
Computer Hardware		
Computer Software		
Training		
Other: Two 12-passenger vans	\$70,000	PBSC
Total Requested Amount	\$120,000	

STRATEGIC ACTION PLAN # 4

Describe Strategic Action Plan: (formerly called short-term goal)	Repair and Restore the Native Plant Garden, water feature and greenhouse
List College goal/objective the plan meets:	College Goal #1: Fullerton College will promote student success. <u>Objective #2:</u> Increase course retention and success.

	<p><u>Objective #3</u>: Increase the number of degrees and certificates awarded.</p> <p><u>Objective #4</u>: Increase the number of transfers.</p> <p><u>Objective #5</u>: Increase the persistence rate of students.</p> <p>College Goal #3: Fullerton college will strengthen its connections with the community</p> <p><u>Objective #5</u>: Increase engagement of the college with the community through college events, community services and other partnerships.</p>
<p>Describe the SAP: (Include persons responsible and timeframe.)</p>	<p>Our vision is to make the native plant area and associated buildings a usable space for students and faculty. This area can enhance the classroom experience and provide students an area for research. We currently have an undergraduate research program (funded through PBSC) that is fast exceeding our space limitations in the 400 Building stockroom. The ant colonies for student research need to be relocated to an area which with sufficient space for colony growth and student observations. We think the buildings in the native plant area are the perfect location.</p> <ul style="list-style-type: none"> • Renovation of the greenhouse will allow the faculty and staff of the Natural Sciences to grow plant material to be used in the biology courses • Renovation of the greenhouse would give students additional space for research projects (SAP#4) • This space would alleviate the need for the room designated the “greenhouse” on the 3rd floor of the 400 building and allow us to allocate that space to the Biotechnology Program for cell culturing • Restoring the water feature to become operational will allow it to be used for student research • Restoring the water feature will add to the overall aesthetics of the area. • The water feature and surrounding plant material will be used as an additional outdoor laboratory for the ecology class to study the population size of mosquito fish, and plant adaptations • Additional plant material added to the garden will showcase the beauty of California native plants and will be an area for the general public to see how these plants can be used in the landscape • The renovation of the buildings will provide additional space to house the ant colonies and prepare specimens from our proposed undergraduate research • Renovating this area will allow us to expand our capability to mentor students, and obtain greater support for research activities, so that more students may take advantage of research opportunities. • This area can be used as an additional tool for outreach for

	<p>incoming students, like the Science Department open house.</p> <ul style="list-style-type: none"> • Additional plant material will be used in the plant identification classes offered by the Horticulture Department of Fullerton College. • Plants can be used as a source of propagation material for the Horticulture Departments plant sales • A new irrigation system with micro emitters and a smart controller will be used to water the plant material and reduce runoff • Irrigation that is ET-based can be used as a demonstration for the public and campus as we move towards increased water conservation and sustainability on this campus • This SAP addresses Weakness 3.2.4 <p>A common theme for this SAP is space limitations, and undergraduate research. We have usable space, and we have students interested in our ant research project. The electricity to the water feature has been restored, the pond has cracks that need repair, but could be operational by spring 2018. The irrigation system upgrades can be a class project for the Horticulture irrigation class that will be offered next semester. Pruning and removal of some trees will have to be coordinated with facilities. Jeff Feaster and Ken Collins are the responsible parties. Work on projects that do not need funding will begin during the winter break</p>	
<p>What <i>Measurable Outcome</i> is anticipated for this SAP?</p>	<ul style="list-style-type: none"> • Increased course retention and success in Biology majors courses • Increased number of degrees and certificates awarded • Increased number of transfers • Increased persistence rate of majors students • Increase engagement of the college with the community through college events, community services and other partnerships • Increased number of students participating in STEM 	
<p>What specific aspects of this SAP can be accomplished without additional financial resources?</p>	<p>The area can be maintained by our student clubs as activities under the supervision of science department faculty, the Horticulture classes can also prune, rake and remove plant debris from the area in coordination with the ground keepers. Students are willing to help make this a usable space. Patching the stream can be done for under \$100.00.</p>	
<p>If additional financial resources would be required to accomplish this SAP, please complete the section below. Keep in mind that requests for resources must follow logically from the information provided in this self-study.</p>		
<p>Type of Resource</p>	<p>Requested Dollar Amount</p>	<p>Potential Funding Source</p>
<p>Personnel</p>		
<p>Facilities</p>	<p>\$10,000.00</p>	<p>College Planning & Budget</p>

		Steering Committee
Equipment	\$4000.00	College Planning & Budget Steering Committee
Supplies	\$1500.00	Natural Science
Computer Hardware		
Computer Software		
Training		
Other		
Total Requested Amount	\$15,500.00	

STRATEGIC ACTION PLAN # 5	
Describe Strategic Action Plan: (formerly called short-term goal)	Increase the mentoring role of faculty with our biology major students
List College goal/objective the plan meets:	<p>College Goal #1: Fullerton College will promote student success. <u>Objective #1:</u> Address the needs of under-prepared students. <u>Objective #2:</u> Increase course retention and success. <u>Objective #3:</u> Increase the number of degrees and certificates awarded. <u>Objective #4:</u> Increase the number of transfers. <u>Objective #5:</u> Increase the number of students participating in STEM activities. <u>Objective #6:</u> Increase the persistence rate of students.</p> <p>College Goal #2: Fullerton College will reduce the achievement gap. <u>Objective #2:</u> Increase retention rate of Hispanic and African-American students by at least 2%. <u>Objective #3:</u> Increase success rate of Hispanic and African-American students by at least 2%. <u>Objective #4:</u> Increase persistence rate of Hispanic and African-American students by at least 2%. <u>Objective #5:</u> Increase the number of students from underrepresented groups participating in STEM activities.</p>
Describe the SAP: (Include persons responsible and timeframe.)	<p>We will survey students in our Cell and Molecular Biology (BIOL 272) and General Ecology (BIOL 274) courses to determine their career goals. Subsequently, students will be matched with a faculty mentor with expertise that aligns with their stated career goals. Faculty members will help and encourage students throughout their tenure at Fullerton College. They will help students find appropriate external learning opportunities as research assistants or interns.</p> <p>We will continue with our biannual Biology Majors Mixer This SAP addresses Weaknesses 3.2.2 and 3.2.3</p> <ul style="list-style-type: none"> • Persons Responsible: Department Coordinator • Timeframe: Ongoing

What <i>Measurable Outcome</i> is anticipated for this SAP?	<ul style="list-style-type: none"> • Increased number of STEM degrees/certificates • Increased number of STEM majors transferring • Increased success of underrepresented groups in STEM majors • Increased success rate of STEM students • Increased persistence and retention of STEM students • Facilitate the creation of a STEM Alumni Network • Increased placement of students in research and internship programs
What specific aspects of this SAP can be accomplished without additional financial resources?	This SAP can begin without additional financial resources, but its full implementation will depend on the creation of a Campus Stem Resource Center (see SAP #1) to coordinate, facilitate, and promote the program.

If additional financial resources would be required to accomplish this SAP, please complete the section below. Keep in mind that requests for resources must follow logically from the information provided in this self-study.

Type of Resource	Requested Dollar Amount	Potential Funding Source
Personnel		
Facilities		
Equipment		
Supplies: Biology Majors Mixer	\$3,000 (\$1,000/year)	
Computer Hardware		
Computer Software		
Training		
Other		
Total Requested Amount	\$3,000	

STRATEGIC ACTION PLAN # 6

Describe Strategic Action Plan: (formerly called short-term goal)	Create a Division Internship Coordinator position
List College goal/objective the plan meets:	<p>College Goal #3: Fullerton College will strengthen connections with the community.</p> <p><u>Objective #3:</u> Strengthen partnerships with local business and industry.</p> <p><u>Objective #4:</u> Increase funding capabilities of the college.</p> <p><u>Objective #5.</u> Increase engagement of the college with the community through college events, community service, and other partnerships.</p>
Describe the SAP:	We propose to hire a full-time Science Division Internship

<p>(Include persons responsible and timeframe.)</p>	<p>Coordinator, who would be housed at the Campus STEM Resource Center (see SAP#1). The internship coordinator would have the following duties:</p> <ul style="list-style-type: none"> • Actively seek out and form new partnerships with local life science and health industries to provide clinical internship, undergraduate research and employment opportunities for our students. • Identify undergraduate research, internship and employment opportunities in all STEM fields. • Identify internships for underrepresented groups. • Keep updated about the LA/OC employment market. • Keep updated about the skills taught in the FC STEM courses and CTE certificates. • Assist STEM majors with the application and interview process for internships and jobs. • Collect all necessary internship documents from students (resume, transcript, application, faculty recommendation, waiver, immunization, progress report, timesheet, etc.). • Visit internship sites to collect information about working conditions and progress reports. • Collaborate with the Campus Career and Life Planning Center (CLPC) to develop and host workshops for scientific resumes, lab skills tests, and interviews. • Conduct career-building workshops and assessments, such as ACT WorkKeys. • Develop FC STEM Alumni Network • Host career-building workshops and alumni seminars • Communicate/market STEM programs to campus and community • This SAP addresses Weaknesses 3.2.2, 3.2.3, and 3.2.4 • Persons Responsible: Department Coordinator, Jo Wu • Timeframe: Temporarily ongoing, funding will make permanent
<p>What <i>Measurable Outcome</i> is anticipated for this SAP?</p>	<ul style="list-style-type: none"> • Increased success of underrepresented groups in STEM majors • Facilitate the creation of a STEM Alumni Network • Increased placement of students in research and internship programs • Increased engagement of the college with the community through college events, community services and other partnerships
<p>What specific aspects of this SAP can be accomplished without additional financial resources?</p>	<p>With current grant support, Danielle Almanza is serving as a part-time Outreach and Internship Coordinator for students in the Biotechnology pathway. The site license for the ACT WorkKeys will be funded by an external grant. Collaboration with CLPC for the assessments and workshops has started.</p>

If additional financial resources would be required to accomplish this SAP, please complete the section below. Keep in mind that requests for resources must follow logically from the information provided in this self-study.

Type of Resource	Requested Dollar Amount	Potential Funding Source
Personnel	\$70,000	\$30,000 from Biotechnology Strong Workforce grant
Facilities		
Equipment		
Supplies		
Computer Hardware		
Computer Software		
Training		
Other		
Total Requested Amount	\$40,000	

STRATEGIC ACTION PLAN # 7

Describe Strategic Action Plan: (formerly called short-term goal)	Faculty and staff for continued growth of Biology Programs
List College goal/objective the plan meets:	<p>College Goal #1: Fullerton College will promote student success. <u>Objective #1:</u> Address the needs of under-prepared students. <u>Objective #2:</u> Increase course retention and success. <u>Objective #3:</u> Increase the number of degrees and certificates awarded. <u>Objective #4:</u> Increase the number of transfers. <u>Objective #5:</u> Increase the number of students participating in STEM activities. <u>Objective #6:</u> Increase the persistence rate of students.</p> <p>College Goal #2: Fullerton College will reduce the achievement gap. <u>Objective #2:</u> Increase retention rate of Hispanic and African-American students by at least 2%. <u>Objective #3:</u> Increase success rate of Hispanic and African-American students by at least 2%. <u>Objective #4:</u> Increase persistence rate of Hispanic and African-American students by at least 2%. <u>Objective #5:</u> Increase the number of students from underrepresented groups participating in STEM activities.</p>
Describe the SAP: (Include persons responsible and timeframe.)	<ol style="list-style-type: none"> 1) The demand for biology classes is high, and with two upcoming retirements in our department (Mary Nolan-Riegle and Carolyn Heath) it is critical that we maintain our current faculty staffing levels in order to meet this demand. 2) Preparation for biotechnology laboratory exercises are very time intensive and require extensive preparation of chemical solutions, equipment, and other supplies. As our new Biotechnology Program becomes fully implemented, it's

	<p>demands will exceed the capabilities of our current stockroom staff. We will need to add another full-time stockroom technician to preparation, supplies, and equipment.</p> <ul style="list-style-type: none"> • Persons Responsible: Department Coordinator • Timeframe: One year
What <i>Measurable Outcome</i> is anticipated for this SAP?	<ul style="list-style-type: none"> • Maintenance of currently levels of biology FTES • Full implementation and growth of Biotechnology Program
What specific aspects of this SAP can be accomplished without additional financial resources?	N/A

If additional financial resources would be required to accomplish this SAP, please complete the section below. Keep in mind that requests for resources must follow logically from the information provided in this self-study.

Type of Resource	Requested Dollar Amount	Potential Funding Source
Personnel	Faculty 1: \$64,236-\$94,354/yr Faculty 2: \$64,236-\$94,354/yr Staff: \$45,036-54,564/yr	General Fund
Facilities		
Equipment		
Supplies		
Computer Hardware		
Computer Software		
Training		
Other		
Total Requested Amount	\$173,508-\$243,272/yr	

7.0 Long Term Plans

Describe the long-term plans (four-six years) for your program. Please consider future trends in your narrative. (Identifying financial resources needed for these plans is optional.)

1. Work in conjunction with the Horticulture Department on construction plans for their new building that could also house our Biotechnology Program. By moving Biotech to the new Horticulture building we will have additional space to expand our course offerings and better serve students.
2. We need to hire new faculty members to backfill two upcoming retirements.

8.0 Self-Study Summary

This section provides the reader with an overview of the highlights, themes, and key elements of this self-study. It should not include new information that is not mentioned in other sections of this document.

1.0 College Mission and Goals

The Biology and Health Education Programs are integral parts of the College Mission and goals in a variety of ways. Science programs promote critical thinking, inquiry and intellectual curiosity, which lead to life-long learning and personal growth. The programs teach diversity on many levels of life, help students understand growth and change, and hold students to high levels of integrity and ethics. The programs support the college goals by working to reduce the achievement gap through PAL tutoring, STEM programs and supplemental instruction. The programs reach out to the campus, district and general public with a variety of programs and events.

2.0 Program Data & Trends Analysis

Enrollment, FTES, and Sections taught in the Biology and Health Education Programs are dependent on the allocations to the programs from the campus and district. The extremely high fill rates and unmet demand, indicated by long waiting lists, demonstrate that the course offerings of these programs could continue to grow should allocations allow it.

Retention and success rates are on par with peer institution programs and are trending in an upward direction. Increased availability of tutoring, mentoring, and access to faculty should continue this trend.

3.0 SWOC

Weaknesses and challenges to the programs include lack of facilities space for program growth in the areas of lectures, labs, biotechnology facilities and student support; the need for additional faculty and staff to support program growth; inadequate resources to support the unique advising, mentoring, and extramural activities (e.g. internships) necessary for a STEM program.

The program strengths and opportunities include the high demand for biology and health courses giving the programs the opportunity for extensive growth; the current support of undergraduate research opportunities; membership in the Orange County Biotech Consortium that provides students with the opportunity to gain skills in the expanding field of biotechnology; a new AS-T in Biology that gives the faculty an opportunity to expand and update the degrees; and a highly dedicated faculty.

4.0 SLO Assessment

The programs are current with their course-level and program-level student learning outcome assessment. As these assessments continue over time, changes will be made to the programs to increase student success.

5.0 Progress Toward Previous Goals

The progress toward the goals of the departments from the last program review cycle have been mixed.

6.0 Strategic Action Plans

The program has seven Strategic Action Plans. These are as follows:

SAP 1: Create a Campus STEM Resource Center

SAP 2: Update Bioscience A.S. degree program and create a 4th Biotechnology certificate

SAP 3: Increase opportunities for students to experience science through research, internships, field trips, etc.

SAP 4: Repair and Restore the Native Plant Garden and associated structures

SAP 5: Increase the mentoring role of faculty with our biology major students

SAP 6: Create a Division Internship Coordinator position

SAP 7: Faculty and staff for continued growth of Biology Programs

These SAPs reflect the desire of the faculty to increase the success of biology students by initiating the growth of the program in course offerings, degrees, and certificates. The plans reflect the dedication of the faculty to student success through faculty mentorship and support for students in STEM. The faculty would also like to support student success through increased opportunities for research, internships, etc. In order to do this, the programs require increased facilities for lecture, laboratory and student support and additional personnel to carry out these plans.

These plans are heavily dependent on financial resources. This reflects the biology faculty's dedication to making Fullerton College a cutting-edge science institution. The increased role of science in our society, reflected by the high demand for biology courses and skilled biologists, make this funding worth the investment.

**Division Deans' or appropriate Immediate Management Supervisor (IMS)
Response Page**

I concur with the findings contained in this

I concur with the findings contained in this Program Review with the following exceptions (include a narrative explaining the basis for each exception):

Area of exception:

I do not concur with the findings contained in this Program Review (include a narrative exception):
