Instructional Programs

2014-2015 Self-Study

Three-Year Program Review

Biology Department

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, David Dorado, Jeffrey Feaster, Carolyn Heath, Mary Nolan-Riegle, Calvin Young, Julie Wells, and Jo Wu

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
Printed name of Department Coordinator	Signature	Title	Date
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.

College Mission and Vision

The Departments of Biology and Health Education are important components of the mission and vision 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 be successful learners and facilitate their personal growth and life-long learning.

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 to promote the healthful wellbeing of our community

College Goals

Our departments are working hard to promote student success and to reduce the achievement gap. 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 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 for Biology Department

KPI	Findings
Enrollment 09-10 - 2940 10-11 - 2912 11-12 - 2436 12-13 - 2614 13-14 - 3340	Changes in enrollments for the last five years have mirrored changes in course units allotted to departments over that period. Enrollments for 2009-2010/2010-2011 varied by less than 1%. Drop in enrollments for 2011-2012 reflect the cut to course offerings on campus. The increase in 2013-2014 enrollments over 2011-2012 reflect the increased summer session of 2013 and the increased allotment for spring of 2014 as the campus moved to meet increased state and district targets with the passage of Prop 30 Tax Increase Proposition.
Total FTES 09-10 - 503 10-11 - 504 11-12 - 428 12-13 - 456 13-14 - 556	Again, the changes to FTES in the Biology Department reflect the changes in unit allocation to the division and department from the campus.
Sections 09-10 - 91 10-11 - 92 11-12 - 84 12-13 - 85 13-14 - 104	As previously stated, the changes to the number of sections reflect the changes to the unit allocations to the division and department over the five-year period.
FTEF 09-10 – 23.9 10-11 – 24.4 11-12 – 28.3 12-13 – 29.0 13-14 – 28.1	FTEF is constant from 2009 to 2011 at 11 full-time faculty equivalents. The FTEF rises to 13-14 equivalent faculty from 2011 to 2013 and falls in 2013-2014 to 12 equivalent faculty. The fall and spring semesters are similar to each other over all of the years. Summer shows different trend, remaining relatively consistent from 2009 to 2013 and then rising to three times the previous numbers in 2013-2014.
Fill Rate 09-10 – 103% 10-11 – 105% 11-12 – 102% 12-13 – 99% 13-14 – 100%	Biology classes are in very high demand. There are always waiting lists that can equal 50% to 100% of the possible enrollment of the class. Addition of students to a class must be carefully monitored, and students who may be able to take the class due to drops/no shows after the first couple of weeks must be added to the class in advance of drops because students who miss the safety introduction are not permitted to take the course and also because much of the lecture information and laboratory exercises for biology classes are posted on MyGateway. Students do not have access to MyGateway information unless they are enrolled in the

	class. Therefore, the Biology Faculty over enrolls classes to account for drops before census. When the district made drastic cuts to the unit allocations to the campuses for classes in the 2011-2012 academic year, the faculty agreed to hold enrollments to the class cap without over enrolling. For this reason, the fill rate numbers dropped in 2012-2013/2013-2014.
<u>WSCH/FTEF</u> 09-10 - 631 10-11 - 619 11-12 - 492 12-13 - 540 13-14 - 786	The fall and spring WSCH/FTEF are the same across the years. The numbers for these two semesters from 2009 to 2011 are in the low to mid-600s. There is a considerable drop in the numbers for fall and spring of 2011-2012 and 2012-2013. The numbers for these two semesters then rise again to the mid-600s in 2013-2014. The summer numbers do not mirror the fall and spring numbers. There are large fluctuations in the numbers for summer classes with some years two to three times higher in WSCH/FTEF than other summers.
<u>Retention/Campus</u> 09-10 – 73%/82% 10-11 – 76%/82% 11-12 – 77%/83% 12-13 – 75%/84% 13-14 – 75%/82%	In both department and campus data, this indicator seems to increase with the difficulty of obtaining classes. Summer retention seems to be the highest and correlates with the presence of 4-year students taking classes at the community collage level. (Informal class survey evidence.) Retention in the Biology Department is 6-9% lower than the campus retention, but fluctuates with the same interval as the campus rates. Again, the higher rate in 2011-2012/2012-2013 could be due to the difficulty in obtaining classes and the persistence of students who do not want to chance not being able to enroll in the class for a subsequent semester.
<u>Success/Campus</u> 09-10 – 56%/67% 10-11 – 59%/68% 11-12 – 61%/69% 12-13 – 59%/68% 13-14 – 57%/66%	Summer success rates seem to be the highest. Again this correlates to 4-year-college, non-native FC students taking classes at the CC level. This data also seems to indicate that the success rate rises as classes become more difficult to obtain. The average success rate in the Biology Department is slightly lower than the campus average success rate and rises and falls with the campus averages.

Enrollment, FTES and sections offered are out of the control of the Biology Department Faculty. The district and campus cut allocations in response to economic conditions in the state. Since extended day courses – adjunct faculty-taught courses – were cut during course contractions, our non-majors general education courses have been most affected. Fill rates indicate that the courses offered by the department are in high demand, and additional investment in these courses by the campus is warranted.

Retention and success rates for students in Biology fluctuate with the campus wide retention and success rates. These numbers are lower for Biology classes than the campus average, most likely because of the rigor of these classes. There are no prerequisites for the general education and introductory science courses, and the basic skills levels of students in these courses may affect their success in challenging science classes.

Since transfer is high for the biology department, data for transfers and degrees awarded, which are missing from KPI data, would be useful for this self-study.

2.2 Peer Institution Comparison

Complete the table below.

College/Program:	Fullerton College	Chaffey College	Glendale College	Riverside Community College	Santa Ana College
Retention:	75%	86%	80%	79%	77%
Success:	58%	60%	68%	59%	57%
Degrees Awarded:	72	17	15	N/A	63
Certificates Awarded:	0	0	0	0	0
~~**Transfers:**~~					

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 Glendale College success rate are outliers. The FC Biology Department has more degrees awarded than the peer institutions.

KPI for Health Education Department

KPI	Findings
Enrollment	From 2009 – 2014 we have enrolled a total of 3037 students with an average of 607 students per academic year. 2009 – 2011 received more than average enrollment; a poor economy may have contributed to higher student enrollment, however, enrollments fell drastically (>30% below avg.) by 2012 – 2013. Potential lack of school funding, and/or students acquiring employment could have contributed. When additional sections were offered for summer 2014, (WSCH 1,201) was highest ever, single term generated from 2009 – 2014.
Total FTES	From 2009 – 2014 we have generated a total 298 FTES with an average of 60 FTES per academic year.
Sections	From 2009 – 2014 we have offered a total of 62 sections of Health Education 140 with an average of 12 sections per academic year. Sections offered decreased lower than average by 33% during 2012 – 2013 academic year, but above average, increase in sections resulted by the same 33%, in 2013 – 2014, with addition of summer school and higher number of section offerings, during the academic year.
FTEF	From 2009 – 2014 we have generated a total of 11.9 FTEF for the Health Education 140 course, with an average FTEF of 2.4 per academic year. The same trend in decreases and increases,

	occurred, as in Sections offered.
Fill Rate	From 2009 – 2014 we have had an average Fill Rate of 103%, ranging from 96% to 109%. Annual Fill Rate did decrease below average from 2012 – 2014 by approximately 7%.
WSCH/FTEF	From 2009 – 2014 we generated an average WSCH/FTEF of 828, ranging from 737 – 953, for the Health Education 140 course. A consistent and higher WSCH/FTEF above average is apparent from 2012 – 2014.
Retention	From 2009 – 2014 we maintained an average Overall Retention Rate of 88%, ranging from 85% - 92%. A consistently higher Retention Rate above average is present from 2012 – 2014.
Success	From 2009 – 2014 we maintained an average Overall Success Rate of 68%, ranging from 63% - 77%. Average Success Rate is consistently higher than average from 2011 – 2013(summer).

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	% Success
Males	75%	59%
Females	75%	55%
Asian-American	77%	65%
African-American	74%	49%
Filipino	81%	65%
Hispanic	71%	50%
Native American	79%	53%
Other Non-White	100%	33%
Pacific Islander	92%	77%
White	80%	63%
Unknown	78%	65%
Range (Max-Min)	29%	44%

2.4 Program Effectiveness

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

The program has been subject to the trends in enrollment that have impacted the entire campus. We contracted our offerings when necessary and expanded them when required. Unfortunately, this does not provide any continuity in our course offerings. Contractions and expansions are typically handled by decreasing or increasing the non-majors general education courses, as we try to maintain some continuity in our major course offerings. Unfortunately, although these trends

have increased the percentage of sections taught by full-time faculty, it has made it harder for us to retain some of our vital adjunct faculty.

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.

"Employment of biological scientists is projected to grow 21 percent over the 2008—18 decade, much faster than the average for all occupations, as biotechnological research and development continues to drive job growth. Biological scientists enjoyed very rapid employment gains over the past few decades—reflecting, in part, the growth of the biotechnology industry. Employment growth will moderate somewhat as the biotechnology industry matures, with fewer new firms being founded and existing firms merging or being absorbed by larger biotechnology or pharmaceutical firms. However, much of the basic biological research done in recent years has resulted in new knowledge, including the isolation and identification of genes. Biological scientists will be needed to take this knowledge to the next stage, understanding how certain genes function within an entire organism, so that medical treatments can be developed to treat various diseases. Even pharmaceutical and other firms not solely engaged in biotechnology use biotechnology techniques extensively, spurring employment for biological scientists. For example, biological scientists are continuing to help farmers increase crop yields by pinpointing genes that can help crops, such as wheat, grow in more extreme climate conditions." (From Bureau of Labor Statistics, U.S. Department of Labor, Occupational Outlook Handbook, 2010-11 Edition)

We have seen increased 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.

Science PAL tutoring for biology (and other math and science) courses has been supported by external funding. A compilation of the tutor logs is included. Although it is difficult to analyze the effectiveness of this tutoring, our students are clearly taking advantage of the opportunity. Unfortunately, the external funding has ended, making it very difficult to continue with this mechanism of student support.

There is a need to institutionalize the support services that students have received through the STEM program and other services offered on temporary grants. A STEM resource center would provide this institutionalization so necessary to the success of STEM students.

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 courses that are in high demand. These include both non-majors and majors courses. Even though we expanded the number of sections of our non-majors courses significantly, they continue to fill to capacity and there is very high, unmet demand. This indicates to us that the overall of the program is strong and capable of sustaining further growth.

External funding has supported PAL tutoring, Biotech Skills Workshops run on weekends, and Science Summer Camp. Unfortunately, as the external funding is ending, these mechanisms to support our students in their coursework and as they acquire valuable lab skills will no longer be available unless other funding is provided. Institutionalizing these programs through a campus STEM Resource Center would ensure the ongoing benefits they provide to students and the community.

The faculty is one of the greatest strengths of the programs. As a group, the faculty gives much of their time outside of their contractual obligations to the success of the students. Tutoring sessions by instructors in common areas and classrooms, before or after the class, is a common sight in the 400 building. Our adjunct faculty members hold many office hours per week in support of students, outside of their contractual obligations. Summer programs for student advancement are also offered. Faculty members also maintain cutting-edge currency in their ever-changing fields. The dedication of faculty to students in these programs is some of the best on campus.

3.2. What are the weaknesses of your program?

We continue to have retention and success rates that are below our peer institutions. However, our rates have been consistent over the period of review and there is no trend in either direction. Although we see no decline in our rates, we also do not see any significant improvement.

With the rigorous coursework and low retention and success rates, we would like to provide more support and instruction in the form of Supplemental Instruction and tutoring but have either been unable to or will not be able to continue due to lack of funding. Grant funding for science tutoring is ending, and this valuable student resource needs to be institutionalized via a STEM Resource Center.

The new science building was built as a replacement building, meaning it was to the exact square footage of the building it replaced. Because of changes in building codes since the original 400 Building was completed, the new building does not serve as many students as the old building or provide space for growth. The increased need for space for laboratory, lecture, student support (i.e., tutoring), etc. has made the science facilities a weakness for the program.

3.3 What opportunities exist for your program?

One burgeoning area of biology is biotechnology. We have made significant strides to increase our offering in biotechnology, with the intent of developing an AS in Biotechnology and Biotechnology certificates. Dr. Jo Wu and Dr. Julie Wells are developing the curriculum required for the degree and certificate. The weekend Biotech Workshops provide students with the opportunity to learn about biotechnology and acquire valuable lab skills without committing to a full course. However, additional sources of funding are required to continue offering these opportunities.

The department is part of the Orange County Biotechnology Education Partnership, a collaboration with Santiago Canyon College, Santa Ana College, Irvine Valley College, and industry leaders. The consortium advisory board is providing guidance for the consortium colleges in the coursework and practical skills that will make our students highly competitive in the biotech job market. The colleges have agreed to develop the required courses to fulfill these requirements.

Recently, the Transfer Model Curriculum (TMC) for Biology was finalized and is ready for use by community colleges across California. Now that the Biology TMC is finalized, CCC faculty have the opportunity to develop degrees that align with the TMC. The associate degrees for transfer reflect statewide faculty dialog regarding appropriate preparation for a given major. Students who complete AS-T and AA-T degrees will benefit from admission preferences and other guarantees at the CSU upon transfer. We are excited with this development as it will provide a welcome avenue for our students who transfer to the CSU system but this appears to require curricular modifications on our part. We will work to align our core courses with the TMC.

3.4 What challenges exist for your program?

The major challenge to our program continues to be the difficulty of further growth of our program. Although great and creative strides have been made to increase the number of sections provided, we are still limited by facilities and support staff. Lecture only classes are limited by the availability of large lecture rooms at appropriate times. Laboratory and combination lecture-laboratory classes are limited by space availability and the need for staff to support the labs. A major part of our facility challenge stems from the fact that the current 400 Science Building was a replacement, matching the original for square footage. This restricts our ability to grow. Additional space for classes might be possible in the form of temporary/permanent facilities such as the swing space labs we used during the demolition and construction. Support staff with additional hours in the evening and weekends would be needed to offer more classes during less traditional times.

The biotech program requires specific courses and facilities where the students can perform and perfect specialized laboratory skills. The 400 Science Building is inadequate for many of these specialized courses. The inadequacies include lack of space, equipment, and the proper ducting and plumbing required for some equipment. Although retrofitting the 400 Science Building is a possibility, the cost to do so and the loss of current limited space makes this an untenable solution. A dedicated facility, possibly in the form of temporary/permanent facilities is preferable.

This challenge is further amplified when we consider the full-time faculty in the department. The faculty are very active and involved, both with on-campus activities and outside activities. We are all very cognizant of the impact that our involvement has on meeting the needs of our students. The number of full-time faculty in the department is barely enough to cover all of the courses taught, even with a strong adjunct faculty contingent. (We said in 2.4 that we have lost many of our adjunct instructors.) As mentioned, when we contracted, it became more difficult to maintain our adjunct faculty. We are also facing the imminent retirement of at least one full-time faculty member but have not been approved to hire additional faculty. This, and other commitments (and potential commitments) by our faculty will put extraordinary strain on the other full-time faculty to cover as many sections as possible in the coming years.

We also face the challenge of identification of and support for our biology major and potential major students. Several programs (e.g., Engage in STEM) have provided some help in this.

However, it is clear that a more centralized, focused program (STEM Resource Center) could be instrumental in identification and providing support for these students.

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)	Dates Assessments Completed	Date(s) Data Analyzed	Date(s) Data Used For Improvement	Number of Cycles Completed
1.	Upon successful completion of courses leading to the Biology A.A., the student will be able to demonstrate an understanding of how the scientific method is used to explore topics in biology.	Fall 2011 – Fall 2014	Fall 2014	• Improvement Plan Fall 2014	1
2.	Upon successful completion of courses leading to the Biology A.A., the student will be able to demonstrate safe and proficient use of laboratory equipment and techniques.	Fall 2011 – Fall 2014	Fall 2014	• Improvement Plan Fall 2014	1
3.	Upon successful completion of courses leading to the Biology A.A., the student will be able to explain the significance of evolutionary theory and how it relates to life on Earth.	Fall 2011 – Fall 2014	Fall 2014	• Improvement Plan Fall 2011 • Revised Plan Fall 2014	2

4.2 Assessment: Complete the expandable table below.

Program Student Learning Outcomes Assessment for Instructional Programs at Fullerton College			
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.	Exam Questions	34 of 34 (100%) successful students answered the 9 exam questions correctly.	N/A
2. Students will be able to demonstrate safe and proficient use of laboratory equipment and techniques.	Student demonstration of correct microscope technique (must score 2.5/3) Taxonomic collections (students must properly collect, identify, and curate at least 20/25 insect and	33 of 40 (83%) successful students were able to correctly operate a microscope. 9 of 13 (69%) successful students were able to properly curate their taxonomic collections.	A revision of supporting activities and increased student feedback have been implemented to increase the number of proficient students. An increased number of curation labs and a distribution of the grading rubric have

	plant specimens)		been implemented to increase the number of proficient students.
3. Students will be able to explain the significance of evolutionary theory and how it relates to life on Earth.	Lab Practicum (students correctly classify and characterize 7/10 specimens)	33 of 40 (83%) successful students were able to classify invertebrate specimens.	A revision of supporting activities and increased student feedback have been implemented to increase the number of proficient students.

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

100% of our PSLOs are being assessed on an ongoing basis. The Biology Department has made progress in the past three years in assessing and evaluating student learning outcomes.

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

We are just beginning our second cycle of PSLO assessment so it is difficult to tell whether our previous improvement plan had an effect.

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

The number of biology degrees has steadily increased for the past 5 years.

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

The Biology Department needs to more closely align our CSLOs and our PSLOs so that improvement plans made at the course level will have a more direct correlation with our desired program outcomes.

5.0 Evaluation of Progress Toward Previous Goals/SAP's (Future program review templates for this section will identify "previous goals" as "previous *strategic action plans*"-- SAP's.)

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

STG 1: Create an online educational "road map" for science students
STG 2: Host a Health Professions Symposium during orientation week before fall semester
STG 3: Host an Annual Science Open House
STG 4: Increase academic mentoring to biology majors
STG 5: Increase out-of-class instruction led by biology faculty and/or student peer facilitators

LTG 1: Create a Research Facility / Biotechnology Center / STEM Resource Center
LTG 2: Create a Science Careers seminar course
LTG 3: Create a Research Methodology course
LTG 4: Create a Science Work Experience/Internship course

LTG 5: Modify/update the Biological Technician AS degree

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

STG1. Create an online educational "road map" for science students
We have developed a print version of the road map and it will be vetted with the Counseling department. We plan on placing the print version in the catalog and class schedules to help our students navigate through the major courses. We are discussing whether to continue with the web implementation of the road map.

STG2. Host a Health Professions Symposium during orientation week before fall semester
Prior to the start of the Fall 2012 semester, the Biology Department, in conjunction with other departments in the Natural Sciences Division, hosted a Health Professions Symposium on the Fullerton College campus. Approximately 130 students, with interests in various allied health professions, attended the symposium. The sessions and guest speakers at the symposium provided outstanding guidance for the students in attendance. However, we had anticipated a much greater number of student attendees. The low attendance is attributed to the failure of the Campus Public Information Office to follow through on their commitment to publicize the symposium.

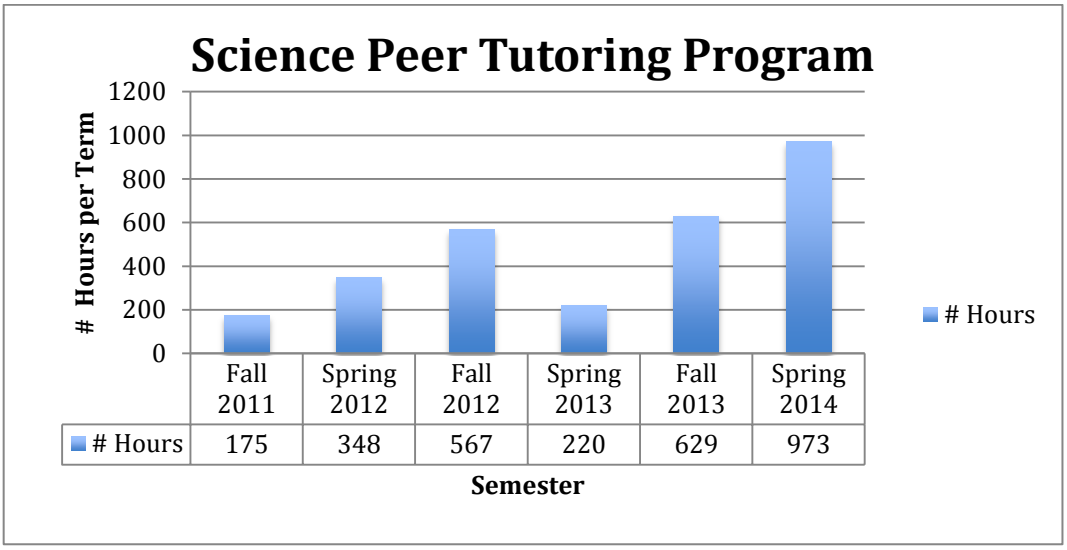
STG3. Host an Annual Science Open House
In Spring 2012 and Spring 2013, the Biology Department, in conjunction with other departments in the Natural Sciences Division, hosted the Fullerton College Science Open House and Research Symposium. Each Open House allowed the general public, including pre-college students from the region, to tour various science lecture and laboratory rooms. Hands-on laboratory demonstrations were hosted in the General Chemistry, Organic Chemistry, Anatomy, Molecular Biology, and Ecology rooms. FC students who were involved in research projects presented posters and Powerpoint presentations. Approximately 200 people, including students and the general public, attended the annual programs. The 2012 Open House celebrated the grand opening of the new Science building, whereas the 2013 Open House helped to commemorate the Fullerton College Centennial. Professor emeritus Dr Allan Schoenherr gave a seminar to an enthusiastic full audience. In 2012, the Research Symposium included 24 student presenters of mainly biology-related and math projects. The 2013, the Research Symposium was expanded to included student presenters in psychology, sociology, and engineering.

STG4. Increase academic mentoring to biology majors
In Fall 2012 all incoming Biology 170 students were assigned a Biology faculty mentor, and were strongly encouraged to meet with their mentor during that semester to discuss their study habits, course progress, career goals, undergraduate research opportunities, and available internships. Few students actually met with their assigned mentor, possibly because they did not perceive a benefit to doing so that early in the semester. However, all faculty teaching the majors classes advise their own current and former students on an ongoing basis, and all Biology 272 students are required to meet with their professor (Dr. Jo Wu) to discuss their progress, career goals, internships, etc.

STG5. Increase out-of-class instruction led by biology faculty and/or student peer facilitators

During the past six semesters, outstanding students in various FC science courses have been recruited to serve as peer tutors for the Science Peer Assisted Learning program (Science PAL). The Science PAL program is not specific to Biology courses, but covers many courses in the Natural Sciences Division. Some tutors were paid (with grant funds), whereas other tutors were volunteers. Depending on the available tutors, students were able to obtain help for 17-32 difference science courses per semester. Supplemental instruction was also provided by several instructors for their courses to biology majors.

Science PAL	Fall 2011	Spring 2012	Fall 2012	Spring 2013	Fall 2013	Spring 2014
# TUTORS	9	13	10	10	6	9
# COURSES	17	24	19	19	30	32
# VISITS	181	225	282	218	148	570
# STUDENTS	63	113	91	65	153	201
# HOURS	175	348	567	220	629	973



Science Peer Tutoring Program (Science PALS). Note that Spring 2013 tutoring records were incomplete.

LTG1. Create a Research Facility / Biotechnology Center / STEM Resource Center

A STEM resource center was temporarily established in an unused facility on the third floor of the Science building. As the room was not furnished, grant monies provided the furniture to allow new STEM students to be mentored by the STEM faculty and counselors. But only a few students could utilize the center at any one time, due to limited space and conflicts with mentoring appointments. Due to environmental problems, the room was closed and the STEM center was moved to Room 318. Unfortunately, hardly any science students visit this room across the Quad. So a dedicated STEM resource center that is close to the science building and activities is still needed.

Fullerton College serves as the distribution center for the Amgen Biotech Experience to Orange County middle and high schools. We produced the biological reagents and loaned equipment to 39 schools, 57 teachers and 5963 students during the 2013-2014 school year. Due to lack of space, there is only one lab bench for the biotech lab technician to work. Currently all of the loan equipment are stored in the molecular biology lab room and the lab stockroom. Most of the reagent production occurs on Saturdays, to avoid conflict with the teaching classrooms, microbiology prep area, dishwashing area and the autoclave.

No progress has been made regarding a laboratory space for research projects. For the past several years, all research projects have been occurring in the biology lab classrooms on weekends, and during non-teaching periods. This requires that all equipment must be inconveniently brought out and packed away each time, and that experiment timing must be carefully managed. Separate areas specifically designated for ecological and molecular student research projects would be beneficial.

LTG2. Create a Science Careers seminar course
A Science Careers seminar course is in the process, with expectation of pre-launch in CurricuNET by February 2015.

LTG3. Create a Research Methodology course
A Science Research Methodology course is in the process, with expectation of pre-launch in CurricuNET by February 2015.

LTG4. Create a Science Work Experience/Internship course
A Science Internship course is in the process, with expectation of pre-launch in CurricuNET by February 2015.

LTG5. Modify/update the Biological Technician AS degree
The Biotechnology Technician AS Degree is currently being updated.

- 10 new classes are in the process of being pre-launched in CurricuNET, including Introduction to Biotechnology, Introduction to Biotechnology Lab, Biotechnology A: Basic Laboratory Skills, Biotechnology B: Protein Biochemistry, Quality and Regulatory Compliance in the Biosciences, Biotechnology C: Molecular Biology, Tissue Culture methods, Biosciences Research Skills, Natural Science Seminar Series, and Biosciences Internship.
- The classes will be pre-launched by February 2015.
- In addition to adding more classes to the AS degree, a three-tiered certificate program is also in the process of being created.

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

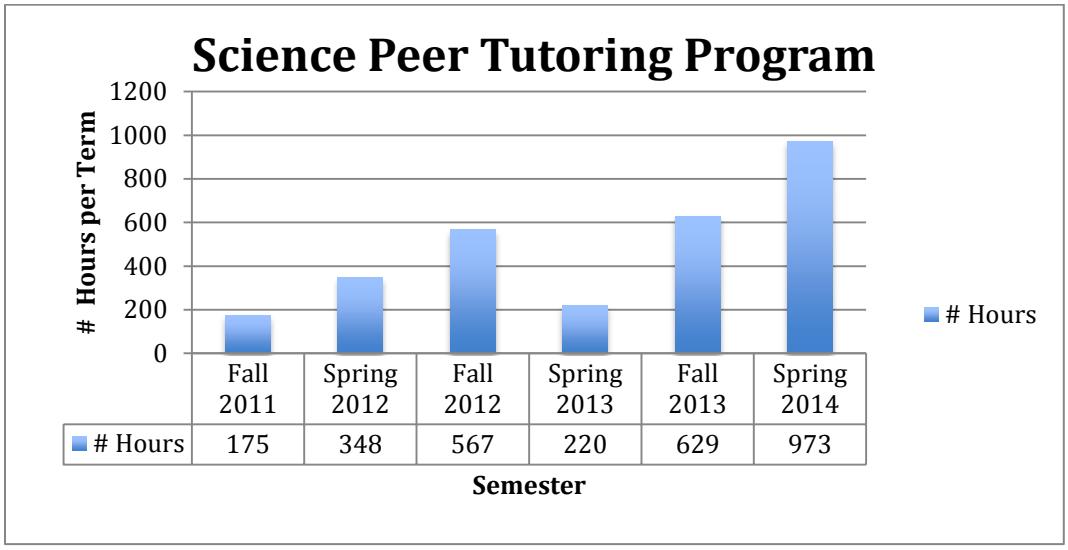
STG1. Create an online educational "road map" for science students
N/A

STG2. Host a Health Professions Symposium during orientation week before fall semester
We measured our level of success by the number of students that attended the symposium and received information and guidance regarding their chosen careers in the health professions. We also administered a survey to all students in attendance, the results of which were very positive.

STG3. Host an Annual Science Open House
We measured our level of success by the number of students that attended the Open House, and the enthusiasm of the student participants and audience. The students who presented talks and posters gained experience and confidence by showing their knowledge and efforts to other students and faculty. The large lecture hall was filled to capacity, with many people standing in the back aisles for the seminar speaker.

STG4. Increase academic mentoring to biology majors
We can measure the level of success achieved by the number of students who met with their assigned mentor in Fall 2012 (approximately 10), and the number of students who have met with Dr. Jo Wu while taking Biology 272 (all biology majors students take Biology 272).

STG5. Increase out-of-class instruction led by biology faculty and/or student peer facilitators
Although we were not able to follow the grades of the tutored students, the tutoring logs show that many students took advantage of the free tutoring program. The table and graph show that over 200 students attended almost 1000 hours of free tutoring during the Spring 2014 semester.



	Fall 2011	Spring 2012	Fall 2012	Spring 2013	Fall 2013	Spring 2014
# Hours	175	348	567	220	629	973

Note that the Spring 2013 Science PAL tutoring records were incomplete.

LTG1. Create a Research Facility / Biotechnology Center / STEM Resource Center
N/A

LTG2. Create a Science Careers seminar course
The progress will be measured by the course being pre-launched in CurricuNET.

LTG3. Create a Research Methodology course
The progress will be measured by the courses being pre-launched in CurricuNET.

LTG4. Create a Science Work Experience/Internship course
The progress will be measured by the courses being pre-launched in CurricuNET.

LTG5. Modify/update the Biological Technician AS degree
The progress will be measured by the courses being pre-launched in CurricuNET.

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

STG1. Create an online educational "road map" for science students
The educational roadmap will allow to students to better plan their academic careers at Fullerton College.

STG2. Host a Health Professions Symposium during orientation week before fall semester
Navigating the educational pathways for the myriad of allied health professions can be daunting for students. Our Health Professions Symposium allowed our students to better plan their careers by receiving directions from those already in those careers. Additionally, many of the health science professionals that participated in the symposium were former Fullerton College students. This allows our students to see that people that were formerly in the same place that they are in have succeeded in becoming successful professionals.

STG3. Host an Annual Science Open House
The Science Open House is a great venue for community outreach, as well as showcasing our talents and facilities. Before 2012, we had participated in the STEM Open House and Symposium held in the College Center. The chemistry demonstrations and anatomy lab models generated excited, enthusiastic responses from visitors and students alike. Some of the visiting pre-college students realized that FC Science has much to offer, and returned for summer science camps, and potentially as college students. In addition to science demonstrations, the 2012 and 2013 Science Open Houses also included a research symposium. In 2012, 24 students presented research on biology and math projects. The 2013 symposium was expanded to included student presenters in psychology, sociology, and engineering.

STG4. Increase academic mentoring to biology majors
Academic mentoring is critical to the retention and success of our students. Through mentoring, students learn of undergraduate research opportunities and internships that increase their level of engagement in our program, and thus the level of success and retention is increased. For example, each year approximately 20 biology majors do long-term undergraduate research at various institutions and agencies. Many of our students also participate in weekend research programs at Fullerton College, CSUF and other agencies.

STG5. Increase out-of-class instruction led by biology faculty and/or student peer facilitators
Providing academic assistance is crucial to the retention and success of our students in both non-majors and majors courses. As the Science PAL tutors are required to be outstanding students in one or more Fullerton College science course(s), these tutors understand the difficulties of both the course materials, the style of the instructors, and the typical challenges of working Fullerton College students. Moreover, faculty-led supplemental instruction sessions have also increased during the past three years.

LTG1. Create a Research Facility / Biotechnology Center / STEM Resource Center
Although there was no creation of a Biotechnology facility, we increased the equipment loan program for the Amgen Biotech Experience (with grant funds).

LTG2. Create a Science Careers seminar course
Although the Science career seminar course has not been proposed yet, we have been hosting many alumni and local scientists to present to the students at FC.

LTG3. Create a Research Methodology course
Although the Science Research Methodology course has not been proposed yet, we have been hosting weekend research projects (funded by grants) in FC biology classrooms, local nature reserves, and at local university partners. We also host monthly Biotech Skills workshops at FC, to improve the lab skills of students.

LTG4. Create a Science Work Experience/Internship course
Although the Science Internship course has not been proposed yet, many students have been encouraged to obtain internships (and have been successfully attaining them) at local college lab stockrooms, nature reserves, universities, and industry labs.

LTG5. Modify/update the Biological Technician AS degree
The modification of the Biotechnology AS Degree has not yet been completed, and therefore has not improved our program to date.

- However, once the new classes are approved by the curriculum committee, addition of new classes to the Biotechnology AS degree will better prepare students for jobs in Biotechnology and Biosciences. The classes will offer hands-on experience to teach students advance research skills needed for a job in the field.
- In addition, one of the new proposed classes that will be added to the degree is to provide students with internships for them to gain experience in the Biotechnology and Bioscience field.

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?

LTG5. Modify/update the Biological Technician AS degree
In fall 2014, a new full-time biology faculty member, Dr. Julie Wells, was hired to help with the development of new courses in Biotechnology. Dr. Wells has experience with many techniques used in Biotechnology and also has experience with using active learning techniques to improve student success in large lecture classes. This experience will help with the development of the new Biotechnology courses.

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

The Biology and Health Programs did not receive funds in the last review cycle. The programs did not collected data as to the impact of this lack of funds.

6.0 Strategic Action Plans (SAP) [formerly called Goals (6) and Requests for Resources (7)]

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:	College Goals: Goal #1: Fullerton College will promote student success. Goal #3: Fullerton College will strengthen connections with the community. Objectives: 1.1: Address the needs of under-prepared students. 1.2: Increase course retention and success.

	1.3: Increase the number of degrees and certificates awarded. 1.4. Increase the number of transfers. 1.5: Increase the persistence rate of students. 3.1: Strengthen our contacts with Alumni. 3.2: Strengthen partnerships with local feeder high schools and universities. 3.3: Strengthen partnerships with local business and industry. 3.4: Increase funding capabilities of the college. 3.5. Increase engagement of the college with the community through college events, community service, and other partnerships.
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: • Identify STEM majors and develop database for tracking • Develop contact folder and meet with STEM majors once a semester. • Identify potential majors and recruit them • 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
What *Measurable Outcome* is	• Increased number of STEM degrees/certificates

anticipated for this SAP?	• 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 student/faculty research opportunities • 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)	**Grow the number of biology sections offered by increasing laboratory space.**
List College goal/objective the plan meets:	**College Goal** Goal #1: Fullerton College will promote student success Goal #3: Fullerton College will strengthen connections with the

	community. **Objective #:** Objective 1.3: Increase the number of degrees and certificates awarded. Objective 1.4: Increase the number of transfers. Objective 3.2: Strengthen partnerships with local feeder high schools and universities. Objective 3.3: Strengthen partnerships with local business and industry. Objective 3.4: Increase funding capabilities of the college. Objective 3.5: Increase engagement of the college with the community through college events, community service and other partnership.

Describe the SAP:
(Include persons responsible and timeframe.)
	• Purchase and install three portable biology laboratory classrooms and a laboratory preparation room. This facility will pay for itself within three years, because of the increase in FTES.
	• If this facility is added to the proposed Chemistry classrooms, then this project will be more cost-effective.
	• Offer the new courses of the Biotechnology Certificate Program in the new facility. Theses course include:
	  ○ Introduction to Biotechnology,
	  ○ Introduction to Biotechnology Lab,
	  ○ Biotechnology A: Basic Laboratory Skills,
	  ○ Biotechnology B: Protein Biochemistry,
	  ○ Quality and Regulatory Compliance in the Biosciences,
	  ○ Biotechnology C: Molecular Biology,
	  ○ Advanced Skill Cell Culture Techniques,
	  ○ Biosciences Research Skills,
	  ○ Natural Science Seminar Series, and
	  ○ Biosciences Internship.
	• Offer the Bio 272: Cellular & Molecular Biology course sections (4 sections per year) in this new facility, due to similar equipment needs.
	• Open the current Bio 272 classroom to allow the expansion of Bio 101: General Biology Laboratory course offerings. Bio 101 had 827 unique unsuccessful attempts at enrollment and was the highest unmet demand course at the college in Fall 2014.
	• Install 2-3 laminar flow hoods, carbon dioxide incubator, liquid nitrogen storage tank in the classrooms
	• Install vacuum, natural gas, plumbing, sewer lines and sinks into the classrooms and prep room
	• Install a free-standing autoclave in the lab prep room
	• Install smart-classroom computer and digital projection system into classrooms
	• Persons responsible for this include the College President, Dean of Natural Sciences Division, Biology Department Coordinator, Biology Stockroom Lab Manager, Biology faculty Jo Wu and Julie Wells.

	• The estimated time frame would be Fall 2016, to coincide with the initial offerings of the courses of the proposed Biotechnology and Biosciences Certificate program.

What *Measurable Outcome* is anticipated for this SAP?	• Increase the number to Full Time Equivalent Students (FTES) per semester by increasing the number of course offerings in the Biology Department.
	• Increase the enrollment in the non-majors General Biology 101 Laboratory course (which was the class with the highest unmet demand in Fall 2014).
	• Expand the course offerings for the Biology department, as currently there are insufficient lab classrooms.
	• Increase the enrollment each semester of the proposed courses in the Biotechnology Certificate program.
	• Increase the number of Biological Technician degrees and Biotechnology certificates.
	• Offer the Biotechnology certificate at an accelerated pace, which could not be offered in the existing Science building due to insufficient lab space.
	• Increase the enrollment in the proposed Introduction to Biotechnology Lecture-Lab course (for potential IGETC credit).
	  ○ Introduction to Biotechnology,
	  ○ Introduction to Biotechnology Lab,
	  ○ Biotechnology A: Basic Laboratory Skills,
	  ○ Biotechnology B: Protein Biochemistry,
	  ○ Quality and Regulatory Compliance in the Biosciences,
	  ○ Biotechnology C: Molecular Biology,
	  ○ Advanced Skill Cell Culture Techniques,
	  ○ Biosciences Research Skills,
	  ○ Natural Science Seminar Series, and
	  ○ Biosciences Internship.

What specific aspects of this SAP can be accomplished without additional financial resources?	None

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	$ 1.5 million	Measure J funds
Equipment	$114,300	Grants/Instructional Equipment
Supplies	$ 7,000 per year	Grants/Lottery Money
Computer Hardware		
Computer Software		
Training		

Other		
Total Requested Amount	$ 1.575 million	

STRATEGIC ACTION PLAN # 3	
Describe Strategic Action Plan: (formerly called short-term goal)	Create a Biotechnology and Bioscience certificate program
List College goal/objective the plan meets:	College Goal #: Goal 1: Fullerton College will promote student success Goal 3: Fullerton College will strengthen connections with the community. Objective #: 1.3: Increase the number of degrees and certificates awarded. 3.2: Strengthen partnerships with local feeder high schools and universities. 3.3: Strengthen partnerships with local business and industry. 3.4: Increase funding capabilities of the college. 3.5: Increase engagement of the college with the community through college events, community service, and other partnership.
Describe the SAP: (Include persons responsible and timeframe.)	• Research curriculum and certificate programs from other colleges with established and successful Biotechnology certificate programs. • Align our curriculum with the Course Identification Numbering System (CI-Ds) for California higher educational institutions, to improve articulation and ease of transfer. There are 5 Biotechnology CI-D courses including BTEC 101L: Introductory Biotechnology with Laboratory, BTEC 150L: Biotechnology with Laboratory, BTEC 210: Advanced Skill Quality and Regulatory Compliance, BTEC 220: Advanced Skill Protein Purification Techniques, and BTEC 230: Advanced Skill Cell Culture Techniques. • Coordinate with other faculty at other community college to establish an Orange County Biotechnology Education Partnership. • Create a three-tiered biotechnology certificate program. The Orange County Biotechnology Education Partnership, consisting of four community colleges, has coordinated a three-tiered certificate program, with two certificates in common with the partnership and each school has their own specialty for the third tier. • Meet annually with an advisory board, consisting of industry and university representatives and statewide directors. The advisory board **dictates which occupational skill sets** are important to potential Biotechnology and Bioscience Employers.

	• Incorporate suggestions from the advisory board into new curriculum. • Create and develop courses in biotechnology and biosciences including Introduction to Biotechnology, Introduction to Biotechnology Lab, Biotechnology A: Basic Laboratory Skills, Biotechnology B: Protein Biochemistry, Quality and Regulatory Compliance in the Biosciences, Biotechnology C: Molecular Biology, Tissue Culture methods, Biosciences Research Skills, Natural Science Seminar Series, Biosciences Internship • Add a facility and equipment that allows for the Advanced Skill Cell Culture Techniques (CI-D: BTEC 230) to be taught at Fullerton College, which we currently do not possess. This is a course in the third tier of the proposed certificate. The facility would need $7,000 for a carbon dioxide incubator, $12,000 for two built-in laminar flow hoods, $10,000 for a liquid nitrogen storage tank, $80,000 for an autoclave, and $5,300 for a service contract for the autoclave. • Identify internship, research, and employment opportunities by contacting alumni, universities, local industry, regional Workforce Investment Board, and trade organizations. • Keep updated about trends in employment in biotechnology and bioscience sectors • Provide mentoring related to job searches and interviewing • Increase the number of students that are prepared for entry level positions in Biotechnology and Biosciences • Offer the Biotechnology certificate at an accelerated pace. • Faculty will attend professional development at regional Biotechnology and Bioscience conferences • Persons responsible for this include Jo Wu and Julie Wells • The estimated time frame to pre-launch new curriculum into CurricuNet is February 2015. • The estimated approval and course offerings would take place in Fall of 2016.
What *Measurable Outcome* is anticipated for this SAP?	• 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?	• Propose the certificate program • Meet periodically with Orange County Biotechnology Education Partners • Meet annually with Biotechnology Advisory Committee • Teach 8 of the 10 classes in the Biotechnology Certificate Program • Two of the course, Biosciences Research Skills and Advanced

	Skill Cell Culture Techniques, would require an annual supply budget of about $5,000 per year.

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	See SAP #2	
Equipment	See SAP #2	
Supplies	$5,000/term	Lottery Money
Computer Hardware		
Computer Software	$1,000	Lottery Money
Training	$5,000	Staff Development and possible grants
Other		
Total Requested Amount	$11,000	

STRATEGIC ACTION PLAN # 4	
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:	College Goal: Goal #1: Fullerton College will promote student success. Goal #2: Fullerton College will reduce the achievement gap. Goal #3: Fullerton College will strengthen connections with the community. Objective #: Objective 1.1: Address the needs of under-prepared students. Objective 1.2: Increase course retention and success. Objective 1.3: Increase the number of degrees and certificates awarded. Objective 1.4. Increase the number of transfers. Objective 1.5: Increase the persistence rate of students. Objective 2.2: Increase retention rate of Hispanic and African-American students by at least 2%. Objective 2.3: Increase success rate of Hispanic and African-American students by at least 2%. Objective 2.4: Increase persistence rate of Hispanic and African-American students by at least 2%. Objective 3.3: Strengthen partnerships with local business and industry. Objective 3.4: Increase funding capabilities of the college.

Describe the SAP: (Include persons responsible and timeframe.)	• 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 increase the number of field trips and field courses offered to enhance the hands-on learning experiences of our students. • 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 the number of field trip opportunities will require another support vehicle (in addition to #402, which 50% owned by Natural Sciences) to reduce competition for motor pool vans. • We will need additional supply budget to accommodate the increased number of students at the Undergraduate Research Symposium.
What *Measurable Outcome* is anticipated for this SAP?	• 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?	Some research, internship, and field trip opportunities already exist for students, however, we can increase their reach and effectiveness with funding for the Campus STEM Resource Center (SAP #1) and the resources requested below.
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	$50,000	General Fund/Equipment money
Supplies	$2,000	Lottery Money
Computer Hardware		
Computer Software		
Training		
Other		
Total Requested Amount	$52,000	

STRATEGIC ACTION PLAN # 5	
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:** Goal #1: Fullerton College will promote student success. College Goal#3 Fullerton college will strengthen its connections with the community **Objective #:** Objective 1.2: Increase course retention and success. Objective 1.3: Increase the number of degrees and certificates awarded. Objective 1.4. Increase the number of transfers. Objective 1.5: Increase the persistence rate of students. Objective 3.5 Increase engagement of the college with the community through college events, community services and other partnerships
Describe the SAP: (Include persons responsible and timeframe.)	• 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 including, Organismal Biology, Botany, Plants and People • The TMC for an AS-T degree in Biology has recently been approved. This includes a Zoology/Botany track. • 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 • 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 • 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 • 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
What *Measurable Outcome* is anticipated for this SAP?	• 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
What specific aspects of this SAP can be accomplished without additional financial resources?	Some plant material can be transferred from the horticulture department to be planted in the garden area. The pond is operational except the electrical source needs to be placed underground. A service request for this was submitted in August of 2013, it has been assigned to our electrician, but has never been started

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	$4000.00	College Planning & Budget Steering Committee
Supplies	$1500.00	
Computer Hardware		
Computer Software		
Training		
Other		
Total Requested Amount	**$5500.00**	

STRATEGIC ACTION PLAN # 6	
Describe Strategic Action Plan: (formerly called short-term goal)	**Develop a new AS-T degree in biology and add a new full-time faculty member**
List College goal/objective the plan meets:	**College Goal:** Goal #1: Fullerton College will promote student success. **Objective #:** Objective 1.2: Increase course retention and success. Objective 1.3: Increase the number of degrees and certificates awarded. Objective 1.4. Increase the number of transfers. Objective 1.5: Increase the persistence rate of students.
Describe the SAP: (Include persons responsible and timeframe.)	• The TMC for an AS-T degree in Biology has recently been approved. • The Department of Biology is working on curriculum updates to satisfy the requirements set forth in the TMC. • As part of the curricular changes, we will be offering Cell and Molecular Biology as the first course for Biology majors. This will necessitate and expansion of the number of sections of this course we offer. • The TMC also adds a Zoology/Botany track for students interested in Organismal Biology. These courses are still in the college catalog, but have not been offered in many years. • Additionally, BIOL 101F (General Biology) had the most unfilled need of any course on campus for the Fall 2014 semester. To meet demand, we would need to add about 25 more lab sections of the course. • The increased demand for Cell Biology, General biology, Botany, and Zoology courses justifies at least one additional faculty member in the department.
What *Measurable Outcome* is anticipated for this SAP?	• Increased number of STEM degrees/certificates • Increased number of STEM majors transferring • Increased access of non-majors students to General Biology
What specific aspects of this SAP can be accomplished without additional financial resources?	All aspects of this SAP <u>could</u> be accomplished without additional financial resources, but student access would be limited.
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	$150,000	District Personnel
Facilities	See SAP #2 & #3	
Equipment	See SAP #2 & #3	
Supplies	See SAP #2 & #3	
Computer Hardware	See SAP #2 & #3	
Computer Software	See SAP #2 & #3	
Training	See SAP #2 & #3	
Other	See SAP #2 & #3	
Total Requested Amount	$150,000	

STRATEGIC ACTION PLAN # 7	
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:	**College Goal:** Goal #1: Fullerton College will promote student success. Goal #2: Fullerton College will reduce the achievement gap. **Objective #:** Objective 1.1: Address the needs of under-prepared students. Objective 1.2: Increase course retention and success. Objective 1.3: Increase the number of degrees and certificates awarded. Objective 1.4. Increase the number of transfers. Objective 1.5: Increase the persistence rate of students. Objective 2.2: Increase retention rate of Hispanic and African-American students by at least 2%. Objective 2.3: Increase success rate of Hispanic and African-American students by at least 2%. Objective 2.4: Increase persistence rate of Hispanic and African-American students by at least 2%.
Describe the SAP: (Include persons responsible and timeframe.)	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.
What *Measurable Outcome* is	• Increased number of STEM degrees/certificates

anticipated for this SAP?	• 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 it 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	0	
Facilities	0	
Equipment	0	
Supplies	0	
Computer Hardware	0	
Computer Software	0	
Training	0	
Other	0	
Total Requested Amount	0	

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. Increase campus/community understanding and engagement with science
   We plan to offer science training workshops for faculty and college students, host seminars regarding science/health careers and current topics of research, organize field trips to visit industry and university sites, provide laboratory research experiences for students, offer science summer camps for younger children, and invite the general public to visit the Fullerton College Science building.

2. Increased numbers of degrees and certificates
   We expect the number of degrees and certificates to increase for the following reasons. (a) The newly adopted AS-T degree and its inherent benefits for transfer will be sought after by many of our students. (b) We are developing an additional degree and several certificates in the burgeoning field of biotechnology. (c) If funded, the STEM Resource Center will allow us to track

and communicate better with our majors and potential majors. We will therefore be able to provide increased support for our majors, including increasing their awareness of degrees and/or certificates they might earn.

8.0 Self-Study Summary

This section provides the reader with an <u>overview</u> 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 Fill Rates of greater than 100% and the 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 lower than those of the college as a whole, but fluctuate with the college rates. The rigor of science classes could be the reason for the lower rates. The departments are at the low end of the scale with peer institutions, but are in the general vicinity of the peer institutions' retention and success rates. Increased availability of tutoring, supplemental instruction and mentoring by faculty could help decrease this gap.

3.0 SWOC

Weaknesses and challenges to the programs include retention and success rates slightly lower than our peer institutions; lack of facilities space for program growth in the areas of lectures, labs, biotechnology facilities and student support (because the new building is a replacement building); the need for additional faculty to support program growth; inadequate equipment for the fledgling biotechnology program; and the loss of external funding for supplemental instruction, tutoring, summer programs, etc.

The program strengths and opportunities include the high demand for biology and health courses giving the programs the opportunity for extensive growth; the current student support offered by the programs due to external funding; 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.

I can finish this in about an hour tomorrow if I can get the finished pieces.

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: 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 and associated structures
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

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 and the creation of a Biotechnology certificate. 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 Program Review.*

☐ *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):*

_____

_____

_____

_____