PROGRAM PERFORMANCE REVIEW
Department of Biological Science
Cal State Fullerton
AY 2008/09 – 2015/16

Submitted by:

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I. *Department/Program Mission, Goals and Environment*

A. Briefly describe the mission and goals of the unit and identify any changes since the last program review. Review the goals in relation to the university mission, goals and strategies.

The Mission Statement for the Department of Biological Science was developed by the Long-Range Planning Committee in accordance with the University M&G and received final approval by the faculty in May of 1996. It continues to guide us in making strategic decisions and remains consistent with the University Mission, Goals, and the current CSUF Strategic Plan (available here - https://www.dropbox.com/s/ch220z491ytu51o/1_2013_2018STRATPLAN.pdf?dl=0).

Mission Statement for the Department of Biological Science:

As an integral component of a large, comprehensive, public university, the Department of Biological Science benefits from and contributes to the rich and changing character of California State University, Fullerton. Our students, majors and non-majors, undergraduate and graduate, are a cross-section of a diverse population with respect to age, ethnicity, culture, academic experience, and economic circumstances.

As a department concerned with creating new knowledge through innovative research and with disseminating current knowledge across the broad discipline of biology, we serve as a regional center for the scientific study of the processes of life.

The Department embraces the University's mission and goals [and strategic plan], and acknowledges its substance as the underpinning of our mission as a department. Our students are challenged to develop intellectually and scientifically, while being prepared for challenging professions and to work for the betterment of society.

Our faculty and staff: (1) strive for excellence in both teaching and research, (2) actively involve students in scholarly, creative and collaborative activities in the classroom, laboratory and field, and (3) affirm that collaborative faculty-student research is an integral and requisite part of learning in the biological sciences.

The Department strives to implement these goals and strategies independent of gender, ethnic, and cultural bias. We assiduously assess our strengths and weaknesses, determine our success in achieving goals, and use these data to update our strategies. We endeavor to maintain an exciting, dynamic, comprehensive and contemporary educational program in biological science.

This mission of the Department of Biological Science has not changed during the review period, and our goals, as well as the activities in which the department engages, are well aligned with that mission, as well as with the Strategic Plan and Goals of CSUF. Whenever CSUF or CNSM goals or strategic plans have changed, the Department has actively contributed to the discussions and ensured that our mission and goals are aligned with newer plans. The Department has been a leader on campus in many of the elements of the Strategic Plan, including (a) engaging students

in high-impact practices, (b) implementing programs such as mandatory advising and Supplemental Instruction (SI) that improve individual student success and narrow the achievement gap for under-resourced students, (c) successfully recruiting and retaining high-quality, research-active, student-centered faculty, and (d) obtaining external grants and contracts to support our mission and goals. The Department contributes to CSUF's goal of becoming a national model public comprehensive university by striving for excellence in all we do to educate all students in the life sciences and to prepare students for careers and graduate programs in biology-related fields.

Goals of the Department of Biological Science:

1. **Curriculum (Aligns with University Goals 1 & 2):**
   Prepare students to be scientifically literate citizens and help them to gain skills and knowledge (e.g., scientific reasoning, teamwork, and critical thinking skills) that will facilitate their success in future careers by providing:
   a. current, rigorous, evidence-based curricula for graduate students, undergraduate majors and non-majors,
   b. significant hands-on laboratory and field learning experiences so that students can learn science by doing science, and
   c. clearly articulated and assessable student learning goals.

2. **Student Access and Success (Aligns with University Goals 1 & 2):**
   a. Promote student access and success by optimizing enrollment capacity and movement of students through the biology degree programs and through our general education (GE) curriculum and service courses.
   b. Promote student success through high-quality academic and career advising and mentorship.
   c. Promote student success by providing high impact practices (e.g., supplemental instruction, advising, capstone experiences, research, internships) to all biology undergraduate and graduate students.

3. **Recruit and Retain high-quality and diverse faculty and staff (Aligns with University Goal 3):**
   a. Continue to hire research-active, student-centered faculty and skilled support staff who will work collegially toward meeting the department's goals.
   b. Provide adequate space, facilities, and professional development support for faculty and staff.

4. **External Funding (Aligns with University Goal 4):**
   a. Increase fundraising through entrepreneurial activities, grants and contracts that support the department's mission and goals.

In all of these educational endeavors, the Department strives to provide excellent learning opportunities that meet the needs of the student populations served, to use student-centered approaches, develop students' critical thinking skills, and to use assessment to improve.

B. Briefly describe changes and trends in the discipline and the response of the unit to such changes. Identify if there have been external factors that impact the program. (Community/regional needs, placement, and graduate/professional school).

Although the core mission and goals have not changed, the Department stays abreast of advances in the discipline and in biology education, and readily implements new initiatives that will enhance student success and meet our mission and goals. During the review period, the Department has kept up with and responded to several new trends in the discipline.

There is a national movement **to promote inclusive excellence and student-centered, active-learning instructional strategies in the life sciences**, led by the American Association for the Advancement of Science (AAAS), the National Science Foundation (NSF), the National Institutes of Health (NIH), the National Academy of Sciences (NAS), the Howard Hughes Medical Institute (HHMI), the United States Department of Agriculture National Institute of Food and Agriculture (USDA NIFA), the American Association of Colleges and Universities (AAC&U), Project Kaleidoscope (PKAL), the American Institute of Biological Sciences (AIBS) and other scientific societies. These efforts are summarized in documents such as *Vision and Change in Undergraduate Biology Education* (http://visionandchange.org) and the Partnership for Undergraduate Life Science Education (PULSE; http://www.pulsecommunity.org) which outline core biological concepts and competencies for undergraduate programs and emphasize the importance of student-centered, inquiry-based instruction, integration of teaching and research, engaging students in authentic research, early exposure of students to research, building a sense of community and of scientific identity, and assessment of student learning outcomes.

Members of the CSUF Department of Biological Science have participated in these national discussions, embrace the goals of these initiatives, and have often led the way in implementing programs that are aligned with these goals, as well as using pedagogical strategies that are supported by science education research. For example, we have a Biology Pedagogy faculty group that includes several faculty who focus on biological science education research and faculty who have led the department's assessment efforts. The redesigns of our majors' and non-majors' programs that were implemented during the previous PPR period are closely aligned with the Vision and Change/PULSE goals. During the review period, biology faculty participated in several National Academies Summer Institutes, PKAL Summer Leadership Institutes for STEM Faculty, and AAC&U and PKAL meetings, helped organize and host SoCal PKAL regional meetings and workshops, and participated in a 2.5-day NSF-funded conference at CSUF at which the Vision and Change goal of transforming undergraduate education in biology was discussed.

During the review period, a major initiative aimed at inclusive excellence and student success in the Department was the introduction, assessment, expansion, and institutionalization of Supplemental Instruction (SI), based on the University of Missouri, Kansas City model (www.umkc.edu/asm/umkcsi/). Along with the Department of Mathematics, biology faculty led the introduction of SI to CSUF, starting in 2007 with the first biology core course, BIOL 171, Evolution and Biodiversity, because of the persistent low pass rates in that course. SI is the only one of several "interventions" that the Department has attempted over the past three decades that

has had a positive effect on student success in our introductory majors course. In 2010-11, SI was expanded to the second core course, BIOL 172, Cellular Basis of Life, which also serves Biochemistry majors and other students preparing for the health professions. Starting in Spring 2014, we were able to offer SI for some sections of our non-majors BIOL 101 course, thanks to support from the Chancellor's Office (CO) Course Redesign program. During the review period, the SI program was supported by external grants, the CNSM Dean's Office, and the Department of Biological Science, before it was institutionalized as a Proven Practice for student success via baseline funding obtained from the 2013-14 CO Course Redesign program, and in 2014-15 CSUF students voted to provide additional funding for the SI program through the Student Success Initiative program. Assessment data demonstrating the positive impact of SI on students and that it closes the achievement gap for underrepresented students, which were collected by the faculty involved with SI and have been presented at several national meetings and in publications, were critical in garnering CSUF, CO, and external support, and CSUF recently became the CSU Center of Excellence for SI. An unexpected benefit of SI in Biology has been the impact on the SI student leaders, 58% of whom have gone on to teaching credential, graduate or professional programs. Documenting the impact of SI on the SI leaders and studying how SI impacts students' content understanding, as well as their attitudes and beliefs about learning, is the focus of a current NSF Improving Undergraduate STEM Education grant involving four of the five departments in the College of NSM.

Consistent with the Vision and Change goals, we have integrated research and teaching in our curriculum, including the core courses in which students formulate and test hypotheses and investigate open-ended questions. During the review period, the Department made several efforts to increase the number of students involved in research and internships, to introduce these high-impact practices to students earlier in their time at CSUF, to help students build a sense of community and scientific self-identity, and to assist transfer students in their transition to CSUF.

C. Identify the unit's priorities for the future.

Framing Our Priorities

Our priorities are shaped by the CSUF strategic plan as well as the Graduation Initiative from the CSU Chancellor's Office (GI 2025). These provide benchmarks for our success such as closing the opportunity gap and working to double our four-year graduation rate and increase our six-year graduation rate by 20% for first time freshmen. Similar targets are proposed for transfer students (http://www.fullerton.edu/grad2025/faculty-staff/Grad-Initiative-2025-Booklet.pdf)

Priority 1

Complete the curricular improvements that are in progress: finish the redesign of the biology majors curriculum, especially the concentrations, and revisions to the minors. Ensure there is a four year pathway for students that maintains rigor and can be accomplished. Collaborate with the Mathematics Department to determine how best to improve students' mathematics and quantitative skills.

Meets CSUF Goals 1 and 2 and supports the Graduation Initiative.

Priority 2

Increase student access to opportunities for faculty-mentored research, academic internships, study away/abroad, and integrative or interdisciplinary capstone experiences.

Meets CSUF Goal 3 and supports the Graduation Initiative.

Priority 3
Increase support for MS students, by advocating for tuition waivers for all teaching associates (TAs) and graduate assistants (GAs), more funds to support graduate student research supplies, travel, and summer research stipends, and by seeking external funding. We should continue to use unfilled faculty positions to support our graduate program by hiring TAs for courses with multiple laboratory sections and GAs for other courses. Show that MS students increase undergraduate student success by mentoring those with whom they work in the lab and field and by serving as diverse role models. We should also increase the size of our graduate program to approximately 75 students.
Supports CSUF Goals 1, 2, 3, and 4.

Priority 4
Expose students earlier to the multiple career options in Biology and paths leading to those careers. Provide more structured career advising to students throughout their time at CSUF, and establish a space for students, faculty, and staff to work together, build community, and participate in workshops on topics such as careers, professional development, leadership, and research ethics.
Meets CSUF Goals 1 and 2.

Priority 5
Improve undergraduate student advising by creating a new full-time staff position (ideally a biology alumnus/a), to answer students' advising questions, address straightforward issues and refer more complex issues to faculty or bioladvising@fullerton.edu, and coordinate our summer orientation and advising programs.
Meets CSUF Goals 1, 2, and 3.

Priority 6
Continue to seek external funds to support our mission and goals so we may increase external funding levels.
Meets CSUF Goal 4 and will help us to meet the other goals.

D. If there are programs offered in a Special Session self-support mode, describe how these programs are included in the mission, goals and priorities of the department/program (e.g. new student groups regionally, nationally, internationally, new delivery modes, etc).

The department of Biological Science does not offer any programs in Special Session self-support mode.

II. *Department/Program Description and Analysis*

The Department of Biological Science is a large and complex department with a large number of majors that has grown significantly over the review period. The Department is dedicated to educating the individual student using active-learning, inquiry-based approaches. Our mission is to help guide students to acquire the skills, develop the attitudes, and master the information necessary to continue their education, obtain desirable employment in biology-related careers, and be productive citizens.

The undergraduate major's curriculum provides all biology majors with broad exposure to fundamental biological principles and depth of knowledge within a specialized area of concentration chosen by the student. It engages students in laboratory and field experiences, requires a capstone experience, and is designed to develop skills identified as important by graduate and professional schools and employers (e.g., critical thinking, oral and written communication, data analysis, accessing resources, working in groups, and creativity).

The Department plays an important role in the General Education (GE) program by ensuring that students understand important biological concepts and how they are relevant to everyday life, by developing biological literacy, and by providing opportunities for students to explore specific biological topics in greater depth in the advanced GE offerings. The Department also offers nine service courses primarily in support of students preparing for careers in health and allied health professions or as teachers. The enrollment from GE courses (not including GE courses in the major) provides roughly 45% of the department's Full-Time Equivalent Students (FTES) per semester. Keep in mind, this will decrease with the addition of ANTH 101 to the GE Area B2.

The Department offers a rigorous thesis-based MS degree program that engages a diverse group of students in faculty-mentored research. Many career opportunities in the sciences require a graduate degree, and the student learning outcomes (SLOs) of our MS program are designed to develop scientific skills and prepare graduates for a variety of careers and graduate or professional school. Our MS students become experts in their selected area of study based on coursework, seminars, and hands-on laboratory and field research, and they present their results both at professional meetings and in peer-reviewed publications. Our graduate students have the opportunity to excel in teaching based on our Professional Aspects of Teaching Biology course (BIOL 500C), as well as the oversight from faculty laboratory coordinators who provide feedback. Our recent MS graduates find employment in the region or seek additional education, with approximately one-third attending PhD or professional schools, one-third working in industry, consulting or governmental agencies, and one-quarter in teaching positions. Biology faculty also contribute to mentoring graduate students in other science departments (e.g., Chemistry and Biochemistry) and cross-disciplinary programs such as Environmental Studies.

Our faculty are committed to using high-impact practices, including the integration of teaching and research, to provide students with opportunities to learn and prepare for biological careers by participating in faculty-mentored research, internships, service learning, supplemental instruction, and advising. The faculty and staff are collegial, hardworking, and dedicated to student success, and contribute to the department, university, and profession in multiple ways.

UNDERGRADUATE PROGRAM

A. Identify substantial curricular changes in existing programs, new programs (degrees, majors, minors) developed since the last program review. Have any programs been discontinued?

B. Describe the structure of the degree program (e.g. identify required courses, how many units of electives) and identify the logic underlying the organization of the requirements.

During the previous PPR period, the Biology major's curriculum was extensively re-designed to incorporate active-learning and inquiry-based approaches which meet the goals of Partnership for Undergraduate Life Sciences Education (PULSE). The curriculum redesign process used backwards design principles whereby the department faculty first defined student learning outcomes (SLOs) and then designed courses to meet those SLOs. **That new curriculum was fully implemented in the fall of 2004 and its structure and the SLOs for Knowledge, Skills, and Attitudes are described in the catalog (http://catalog.fullerton.edu/preview_entity.php?catoid=1&ent_oid=70&returnto=52#Learning_Goals_and_Student_Learning_Outcomes).** Based on assessments of that curriculum and in response to external constraints (increased enrollments, reduced resources, insufficient laboratory space, etc.), the department initiated revisions to the majors' program during this review period, first to expand the mathematics requirement and later to address structural constraints by reducing the number of units required in the core sequence and to provide more flexibility in the sequence in which courses must be taken. The overall goals for student learning have not changed but we have simplified them.

Biology majors are broadly exposed to key biological principles through the four-course core sequence with lab/field components, learn in-depth knowledge within their chosen Concentration, and receive interdisciplinary Mathematics and Science training via the required supporting courses (calculus, statistics, general and organic chemistry, and physics). There were four sequential 5-unit core courses (BIOL 171, Evolution and Biodiversity, BIOL 172, Cellular Basis of Life, BIOL 273, Genetics and Molecular Biology, and BIOL 274, Principles of Physiology and Ecology) to provide breadth of subject matter and develop specific skills sequentially across the four courses. The new core curriculum (to be fully implemented in Fall 2017) consists of the following courses, each with lab/field components, a total of 16 units:

BIOL 151: *Cellular & Molecular Biology*. Lecture and laboratory exploration of eukaryotic/prokaryotic cellular structure and function, biological molecules, classical/Mendelian genetics, regulation of gene expression and biotechnology, cell signaling, metabolic pathways, the process and regulation of cellular reproduction, evolution of multicellularity. (3 hours lecture; 3 hours laboratory, 4 units)

BIOL 152: *Evolution & Organismal Biology*. Introduction to evolution and organismal biology. Emphasizes the evolutionary processes that resulted in the biodiversity of life on Earth. Includes the physiological processes and ecological challenges for organisms. (3 hours lecture; 3 hours laboratory/fieldwork, 4 units)

BIOL 251: *Genetics*. An introduction to the genetic and molecular mechanisms of transmission of the genetic information. The processes of inheritance, replication, transcription, and translation of the genetic material. (3 hours lecture, 3 units)

BIOL 252: *Principles of Ecology*. Principles governing the interactions between organisms and their environment at individual, population and community scales; energy and material flow through ecosystems; determinants of global, regional and local biodiversity; and approaches to manage environmental resources sustainably. (3 hours lecture, 3 units)

BIOL 253L: *Cell and Molecular Biology Skills Laboratory*. Modern molecular biology and genetics research requires specific technical skills. This course will provide experience in classic and modern molecular biology laboratory techniques in a genetic framework. Experimental design and scientific presentations, both oral and written, will also be performed. (3 hours lab, 1 unit)

BIOL 254L: *Research Skills for Ecology and Organismal Biology*. Research skills needed in ecology and organismal biology, in the laboratory and field, including making observations and designing experiments, measuring biotic and abiotic variables, conducting library research, working in teams, communicating scientific information, and analyzing data statistically. (3 hours lab/field, 1 unit)

The core courses provide a solid basis for understanding the principles that underlie the many distinct disciplines of biology, and instructional attention is focused on individuals working as parts of small teams. These teams work together in the laboratory and field to discover information about the biological world. After the core, students must complete 24 units of biology. Most of these are completed in a concentration consisting of 23 units of upper-division biology electives, including at least 5 units of laboratory- or field-based course work, at least 6 units 400-level, and at least 2 capstone units. There are now five Concentrations, in Cell and Developmental Biology, Ecology and Evolutionary Biology, Marine Biology, Molecular Biology and Biotechnology, and Plant Biology (as of Fall 2016), each with specific course selections and requirements for the 23 upper-division biology units (http://catalog.fullerton.edu/preview_entity.php?catoid=3&ent_oid=280&returnto=286). The capstone experience is designed to provide "a venue for direct, practical experiences related to the study of biology or the pursuit of a biology career. A capstone course emphasizes application of student skills in biology through research, field, internship, or service-learning projects that reflect the paradigms of the discipline, i.e., problem-solving and scientific communication." BIOL 495, Biological Internship, BIOL 498, Senior Thesis, BIOL 499L, Independent Laboratory Study, as well as specific courses in each concentration, meet the capstone requirement.

As is typical of undergraduate programs throughout the nation, CSUF Biological Science majors must also complete the following supporting mathematics and science courses: one year of general chemistry with lab (CHEM 120A and 120B, 10 units), one year of organic chemistry with lab (CHEM 301A, 301B, and 302 or 302A and 302B, 8 units), one year of physics with lab (PHYS 211, 211L, 212, and 212L, 8 units), and two semesters of calculus (Math 150A and 150B, 8 units) or one semester of calculus and one semester of upper-division statistics and experimental design (Math 130 and 338, 8 units). Previously, only one semester of calculus was required, but in the fall of 2011, we expanded the requirement to add an additional semester of

statistics or calculus. Two semesters of Mathematics will help our majors strengthen the computational and analytical skills needed to succeed in biological science.

GRADUATE PROGRAMS

A. Identify substantial curricular changes in existing programs, new programs (degrees, majors, minors) developed since the last program review. Have any programs been discontinued?

B. Describe the structure of the degree program (e.g. identify required courses, how many units of electives) and identify the logic underlying the organization of the requirements.

Master of Science in Biology

Although the structure and core components of the MS in Biology Program have remained the same since the previous review, we have made significant improvements to the administration of the program. This was facilitated in part by the improved continuity achieved by delegating program administrative duties to a single faculty member, rather than rotating duties among instructors of BIOL500A/B. The Biology Graduate Program Adviser works closely with the Academic Administrative Coordinator and other staff to oversee the review of graduate applications, make final admission decisions, provide orientation and training to new students, mentor faculty on graduate student issues, track student progress through the program and afterwards, allocate resources for research, mediate conflicts between students and their faculty mentors, and represent the department in interactions with the administration. Over the review period we have moved to electronic evaluations of applications, significantly revised the Graduate Student Handbook and program website (http://www.fullerton.edu/biology/grads/) to attract applicants, developed a poster that can be used as a recruitment tool, organized and delivered day-long orientation sessions for incoming students, and implemented a formal graduate student advising process to help both students and faculty navigate through coursework and thesis committee meeting requirements in a timely and efficient manner. In addition, the Graduate Advancement Committee has instituted orientation sessions with new tenure-track faculty to review the MS requirements and expectations, and to help them become more effective mentors.

Analysis of the Graduate Program with respect to UPS documents.
Review/adoption of department structures for graduate committees and departmental graduate advisors (UPS 270.102). We found our program to be in compliance. Our graduate program committee (the Graduate Advancement Committee) has four qualified members including the Biology Graduate Program Adviser, who administers the program in coordination with the Academic Administrative Coordinator. Each student has a supervisory committee called the Thesis Committee that assures compliance with our department's practices and rules, as well as the UPS, as set out in the Graduate Student Handbook.

Review/adoption of standards for faculty qualifications to teach 500-level courses (UPS 270.103). Our program meets the requirements of UPS 270.103 regarding staffing of 500-level

graduate courses—all 500-level courses are taught by tenured or tenure-track faculty with PhD or equivalent degrees.

Review requirements for the "culminating experience" (UPS 330.163). The culminating experience for our graduate students is the writing and oral defense of thesis and a public presentation of the results of the thesis research. This experience is further defined in the Graduate Student Handbook. The defense is the opportunity for the graduate student to present her/his data and place them in the context of the existing literature demonstrating in the process mastery of the larger body of knowledge associated with the thesis topic. The public presentation demonstrates the graduate student's ability to communicate orally and to coherently answer questions posed by those inside and outside of her/his area of expertise.

Graduate writing requirement (UPS 320.020). All MS students complete BIOL500A and BIOL500B in their first year of the program. In these professional development courses, students complete multiple writing assignments, including development of the scholarly thesis research proposal, and they receive and address feedback from both the course instructor and their faculty thesis advisers.

Students who successfully complete the MS in Biology are prepared for careers in teaching, the health professions, government agencies, environmental consulting firms, or private industries, or to enter PhD programs or professional programs in fields related to biology.

Master of Science in Biotechnology

The Masters of Biotechnology (MBt) program was started as a multi-campus professional masters degree program. Unfortunately, the program did not succeed in attracting a large number of students, the multi-campus nature of the program created difficulties for program administration, and, on our campus, there were very few full-time faculty involved in teaching or administering the program. The program was suspended and last accepted students in fall of 2013 when there was an unsuccessful attempt to move the program from State to Self-Support. There are also no active students currently enrolled in the program and we have asked that the program be discontinued during the 2017-2018 academic year.

C. Using data provided by the office of Analytic Studies/Institutional Research discuss student demand for the unit's offerings; discuss topics such as over enrollment, under enrollment, (applications, admissions and enrollments) retention, (native and transfer) graduation rates for majors, and time to degree.

The undergraduate data are in Appendix 1, the data for the graduate programs are in Appendix 2.

First Time Freshmen: The number of applications has increased, decreased and has stabilized around 2800. The percentage admitted has declined (due to impaction) by 16%. The yield of students (admitted to enrolled) has ranged from 12 – 21% and has varied over the period of review.

Four-year graduation rates range from 7 to 12% and have increased 5% during the period of

review. However, this is primarily because of an increase in the number of students graduating in four years after changing to other majors. Six-year graduation rates in the major have increased slightly (from 21.3% to 26.3%). In contrast the six-year graduation rate for students who change majors has increased dramatically (from 19.7% to 40.2%). The increase in six-year graduation rate for students who leave biology has driven a large increase in our overall rate (40.9% to 66.0% all students who enter as biology majors and graduate with a biology degree or another major).

Upper Division Transfers: The number of applications has increased, and the percentage admitted has declined (again due to impaction). The percentage enrolled ranges between 33% – 53% and did not change over the period of review. However, we have not enrolled as many transfer students in recent semesters. Two-year graduation rates have remained largely stable (ranging from 2 to 19%). Four-year graduation rates in the major have increased slightly (avg 38.5%, the fall 2012 cohort's rate was 42.4%) and those that have changed major have also increased over the period of review (avg = 13.9%, the fall 2012 cohort's rate was 13.8%). The department's overall four-year graduation rate has increased by 12.3%.

Graduate Students: The number of applications has decreased by 14% relative to the average over the period of review (77.4). We have admitted roughly the same percentage of students in every cohort (34%) but our yield has decreased by 5% relative to the average over the period of review (71%). Four-year graduation rates for our MS students have averaged 43.9% and are quite variable over the period of review. Two-year graduation rates have averaged 5.9% and are also quite variable over the period of review. We are in the process of discontinuing the M.S. in Biotechnology and, starting in Fall 2013, we have not admitted any students. The data are available in the appendix but are not discussed here.

D. Discuss the unit's enrollment trends since the last program review, based on enrollment targets (FTES), faculty allocation, and student faculty ratios. For graduate programs, comment on whether there is sufficient enrollment to constitute a community of scholars to conduct the program.

The undergraduate data are in Appendix 1, the data for the graduate programs are in Appendix 2.

Despite strong growth in the number of majors, our FTES is declining. The number of undergraduate majors and graduate students increased from 842 to a maximum of 1418 in AY 13 – 14 and in AY 15-16 was 1221.5 and FTES increased from 874 to a maximum of 1057 in AY 13 – 14 and in AY 15-16 were 950.2. During the review period we have increased 9% (874.3 to 950.2) in FTES and 44% (888 to 1279) in headcount. Our FTES targets have followed a similar trend, peaking in AY 13-14 at 1070 and the AY 15-16 target was 984 FTES. This discrepancy was caused by the recent reduction in units in our lower-division core classes to reduce structural bottlenecks and a waiver of GE Area B2 (BIOL 101) for many of the high-unit majors in the College of Engineering and Computer Science. The department's enrollment in GE courses is likely to continue to drop with the addition of ANTH 101 to GE Area B2.

Our graduate program has averaged an annualized headcount of 54.6 students. Despite difficulties recruiting, we have maintained an enrollment of around 50 graduate students in the

program. This is sufficient enrollment to maintain a community of scholars in the program. We would like to grow the program to 75 (two to three students per advisor) or more students but are limited by the number of faculty advisors and resources to support students.

E. Describe any plans for curricular changes in the short (three-year) and long (seven-year) term, such as expansions, contractions or discontinuances. Relate these plans to the priorities described above in section I. C.

We plan to have the concentrations revised during the 2017-2018 academic year. Our changes to the concentrations include:

1) The addition of a physiology and evolution requirement for all students. The faculty felt that students' knowledge of these two areas was insufficient.
2) We have reduced the units in each concentration from 23 to 12-14. Twelve is the minimum required by policy. The plant biology concentration requires 12 units and all others require 14. The remaining upper-division units can be completed as electives.
3) Each student is required to complete six lab units (it was previously five) due to the reduction in lab in the lower division and three of those six units must be completed in the concentration.

We are in the process of revising the minors to include the new lower division core. The changes to the lower-division have also required us to revise our prerequisites for all of our courses.

Our General Education offerings have not been revised in a number of years and the Department plans to review, revise and develop courses for GE Area B2 – Life Sciences that will still cover the learning objectives of the category but present the material from a perspective that may be more attractive and engaging to students (e.g. Disease Biology). We plan on beginning this process in 2017-2018.

The Master's of Biotechnology Program has no active students and we plan to discontinue this program during the 2017-2018 Academic Year.

F. Include information on any Special Sessions self-support programs offered by the department/program.

The department of Biological Science does not offer any programs in Special Session self-support mode.

III. *Documentation of Student Academic Achievement and Assessment of Student Learning Outcomes*

Because student learning is central to our mission and activities, it is vital that each department or program includes in its self-study a report on how it uses assessment to monitor the quality of student learning in its degree program(s) and/or what plans it has to build systematic assessment

into its program(s). Please provide information on the following aspects, and if applicable, please feel free to include relevant documents in the Appendices.

A. Describe the department/program assessment plan (e.g. general approach, time table, etc.) and structure (e.g. committee, coordinator, etc.), and if applicable, how the plan and/or structure have changed since the last PPR.

Our Assessment program and plan are coordinated via our assessment committee which is chaired by a faculty member who coordinates our efforts. Since the last PPR, we have made a number of changes to our program. For ten years, graduating biology majors were required to take the Major Field Test in Biology (Educational Testing Services). The exam was nationally normed, allowing us to compare the performance of our students to those at comparable institutions. The performance of CSUF biology majors parallels that of biology majors nationwide and, in most cases, our population is at or above the national average score. Our students consistently perform best in the content areas that match their area of concentration within the major, with students in the *Molecular Biology and Biotechnology* concentration showing the strongest performance overall. While the information obtained from the major field test was excellent for benchmarking our performance versus others, it was not extraordinarily useful for assessment of our SLOs.

Validated Assessment Instruments
Formative and summative assessment of student knowledge has also been done through the use of biology concept inventories. A concept inventory is a collection of multiple-choice questions addressing foundational concepts within a sub-discipline of biology that have been shown to be reliable and valid. The **Introductory Molecular and Cell Biology Assessment** was used to measure formative and summative content knowledge across a single course (Biology 172 (151) *Cellular Basis of Life*) and across the curriculum (from Biology 172 (151) to Biology 303 – *Intermediate Cell Biology*). A similar instrument, the **Conceptual Inventory of Natural Selection**, will be used to evaluate student learning gains both in Biology 171(152) *Evolution & Biodiversity* and across the curriculum (BIOL 325 – Principles of Evolution). In addition, we have used the **Test of Scientific Literacy Skills** (TOSLS). TOSLS is a validated assessment instrument designed to evaluate students' ability to 1) recognize scientific evidence, 2) distinguish between types of sources, 3) recognize valid and ethical scientific practice, 4) identify strengths and weaknesses in research design, 5) identify the proper format of graphical representation, 6) interpret graphically representations, 7) calculate probabilities, 8) understand the need for statistics and 9) interpret and critique experimental designs (Gormally, Brickman, and Lutz 2012). The assessment committee has been systematically assessing learning objectives (see table later in this section).

Alumni Success
We have not been able to actively assess alumni success because of insufficient resources (time and money). In the past, we did have students fill out hard-copy surveys when they filed for graduation, but the data were never compiled. Many of our graduates are accepted into programs leading to graduate and professional degrees or enter the workforce in areas relating to biology. As mentioned in our previous PPR, we need to invest time and effort to reach out to and track our Alumni better. We will be able to mine data from the CNSM alumni survey.

Classroom Assessments
All courses use a variety of class-specific assessments to measure student learning. Assessment techniques range from the use of iClicker questions to quizzes and exams. Group work, writing, in-class and online discussion forums are just some of the methods employed by faculty in the department.

Anderson, D.L., Fisher, K.M. and Norman, G.J. (2002) Development and Evaluation of the Conceptual Inventory of Natural Selection. J. Res. Sci. Teaching 39:952-978.

Gormally, C., Brickman, P. and Lutz, M. (2012) Developing a Test of Scientific Literacy Skills (TOSLS): measuring undergraduates' evaluation of scientific information and arguments. CBE Life Sci. Educ. 11:364-377.

Shi, J., Wood, W.B., Martin, J.M., Guild, N.A., Vincens, Q., and Knight, J.K. (2010) A Diagnostic Assessment for Introductory Molecular and Cell Biology. CBE Life Sci. Educ. 9:453-461.

B. For each degree program, provide the student learning outcomes (SLOs); describe the methods, direct or indirect, used to measure student learning; and summarize the assessment results of the SLOs.

The table below summarizes were we are currently with the assessment of our SLOs and Performance Outcomes (POs) for each program and is taken from our Fall 2016 Assessment Report.

Biological Science SLOs and POs	**Criteria for Success**	**Current State of Assessment**
Explain fundamental biological principles from the major areas of biology (cellular, molecular, physiology, organismal, ecology, and evolution).	1) Significant increase in concept inventory scores from pre- to post-testing within relevant courses. 2) Significant increase in concept inventory scores in upper-division courses than in introductory courses.	Partially assessed in spring 2015. Results limited. Reassessed 2015-2016
Design a biological research study to answer a testable question, using appropriate and ethical research procedures for data collection and analysis.	1) Significant increase in TOSLS scores from introductory to upper division courses. 2) 70% on Experimental Design Test after instruction in introductory course.	Assessed in BIOL 151/152 and BIOL 424, 418 in SP 2016.
Communicate ideas related to biological concepts, or the results of biological investigations, using professionally appropriate oral (e.g. poster or oral presentations), visual	1) Upper-division students average 70% on presentation rubric. 2) Student self-report improvement in writing, oral, and visual presentations.	Planned: Spring 2017 – Fall 2017

(e.g. graphs, tables), and written (e.g. research proposal, journal article) formats.		
Engage in projects that require contributions of multiple individuals, resulting in a product that reflects the ability to collaborate and communicate.	1) A minimum of 75% of introductory, gateway, and capstone courses include a collaborative assignment that meets Performance Objective. 2) Student self-report improvement in ability to work collaboratively.	Planned: Spring 2017 – Fall 2017
Demonstrate intellectual independence by distinguishing between reliable and unreliable sources of information while respecting alternative possibilities and explanations.	1) Significant increase in TOSLS scores from introductory biology to capstone course.	Assessed in BIOL 151/152 and BIOL 424, 418, in SP 2016
Discuss the impact of biological issues on society, the importance of responsible conduct of research, and the role of society in supporting scientific endeavors.	1) Positive evaluation by students of BIOL support for stewardship 2) Evidence of participation in stewardship activities (self-report)	Planned: Fall 2017

SLO I: Concept Inventory for Natural Selection (CINS) and Intermediate Molecular and Cell Biology Assessment (IMDCA)

Our assessment goal for SLO 1 was to determine if introductory biology students improve in their understanding of natural selection and basic concepts in cell and molecular biology. To accomplish this goal, we administered two published concept inventories to introductory and gateway courses. The first concept inventory, the CINS was administered to students in BIOL 171 and 325 in Spring 2015, and BIOL 152 in Spring 2016. However, due to issues with Qualtrix the BIOL 171 and 152 data are not available at this time. The second concept inventory, Intermediate Molecular and Cell Biology Assessment, was administered to students in BIOL 172 and BIOL 303 in Fall 2013 and Fall 2014.

To summarize available data:
CINS – students in BIOL 325 performed well on the CINS, averaging 85% across the concept inventory. Given that published average percent correct across 29 biology major courses (introductory and intermediate level courses) was 43% in Andrews et al. 2011, our students are likely demonstrating improvement in understanding of natural selection concepts as they move through relevant gateway courses.

IMCBA – students in BIOL 303 (pre-instruction) outperformed introductory students (post instruction) in BIOL 172 on 21/24 questions, ranging from 1 to 36 percentage point improvement. Average scores improved by 17% between the courses.
Once we access the full set of data, we will be able to complete assessment of SLO 1 for natural selection and cell and molecular biology concepts. Accordingly, we view this assessment as in

progress. However, we have preliminary support for increased understanding of key biology concepts from introductory to intermediate levels.

SLO I: Genetic Drift Inventory GeDI (2016)
We used a published concept inventory, the Genetic Drift Inventory (GeDI) to assess student understanding of genetic drift concepts in BIOL 152. Students took the test at the beginning and end of the Spring 2016 semester.

Pre and post-test scores were compared with a paired t-test. Students showed significant improvement on genetic drift understanding, based on changes in GeDI scores. The post-test average score falls within the national range of scores from upper division courses (Price et al. 2013, 2016). The improvement from pre- to post-instruction, and relatively high performance of our introductory level students, is encouraging and shows that we have, for this concept, met our assessment target for this SLO.

SLO II, V Test of Scientific Literacy Skills (TOSLS) (2016)
We used a published concept inventory, the TOSLS, to assess student experimental design, quantitative data interpretation and scientific literacy skills. Students took the test at the beginning and end of the semester in BIOL 151, at the mid-semester point in BIOL 152, and towards the end of the semester in BIOL 418 and 424.

Post-test scores from all courses were compared with a Kruskal-Wallis rank sum test, followed by post-hoc pairwise comparisons. We found significant differences between all courses.

Performance on the TOSLS was highest in upper division courses, with students averaging 69% on the test. Students also showed significant gains from the post test in BIOL 151, the first major course they take, to BIOL 152, the second course in the series.

Based on these findings, it appears that we have met our assessment target for this measure. Upper division students are scoring significantly higher on the test, and our student scores are consistent with national averages in the literature.

SLO II (Additional Evidence)
We used an unpublished, but vetted, test of experimental design ability to assess introductory (BIOL 152 – one lecture section) student experimental design ability. This test was administered after instruction in experimental design. We set a standard of an average score of 70% for the test. However, students averaged 52.3% correct responses on the full test. When we examined item level performance, a clear pattern emerged. Students performed poorest on items related to *replication* or *identification of experimental units.*

Based on these findings, it is clear that the current lessons in BIOL 152 on experimental design are not sufficiently addressing the ideas of replication and experimental units in the lecture section tested. These data will be shared with the other introductory course instructors to help redesign instruction on experimental design. However, because we do not have data from this measure in other courses, it is unclear how our students progress with regards to the concepts measured with this instrument.

Graduate SLO Assessment 2016

MS Biology Program Student Learning Outcomes (MS_SLOs)	Criteria for Success	Current State of Assessment
Demonstrate expertise in a biological discipline through critical evaluation of primary literature and knowledge of appropriate research approaches and techniques.	**Provide comments on potential criteria for success.** **E.g. XX% increase in average score from first to second committee meeting.** **Possible Assessment: Score on rubric used in first and second committee meetings regarding knowledge of literature, relevant research techniques and approaches**	Planned: Spring 2018 – Spring 2019
Demonstrate expertise in a biological discipline through the design, execution, analysis, and interpretation of an independent ethical research project.	**Provide comments on potential criteria for success.** **E.g. XX% increase in average score from 500A/B to Thesis Defense.** **Possible Assessment: Score on simple rubric used by faculty in 500A/B Poster Presentation and Thesis Defense.**	Planned Spring 2018 – Spring 2019
Communicate the results and conclusions of an independent research project orally and in writing to appropriate professional audiences.	1) 50% of MS students present in at least one professional conference within five years of starting MS program. 2) At least 30% of MS students are listed as an author on a **submission to a peer-reviewed journal** within 5 years of starting MS program.	Assessed by Graduate Committee from 2009 – 2015.

Assessment Committee: Bold text represents proposed changes or additions to criteria for success.

MS-SLO III

The Graduate Committee, led by Dr. Paul Stapp, tracked MS student participation in professional conferences and publication in peer-reviewed journals from 2009 - 2014. We found the following levels of participation:

- 48.9% of MS students have participated (poster or oral presentation) in a national or international conference while 66.7% of MS students have participated in any conference (CSU/regional or National/International)
- 26.7% have published in a peer-reviewed journal.

While our student presentations at conferences are at levels that meet our stated criteria for success for presentations, we are slightly below our desired goal for publication. However, data from 2015 suggest that we are improving in that regard (2009 - 2015: 29% of students have published).

We have met most of our stated goal for presentations and are slightly below our stated goal for publications. We plan to meet as a department to review our MS-SLOs and discuss if our criteria for success are appropriate for our student population and goals of the department faculty for the graduate program.

C. Describe whether and how assessment results have been used to improve teaching and learning practices, and/or overall departmental effectiveness. Please cite specific examples.

Use of SoftChalk to develop supplemental resources to enhance student learning
Evidence of a lack of student preparation for course-specific laboratory activities has led us to develop **Pre-Lab** activities using *SoftChalk.* Pre-labs are delivered online and provide a forum for students to engage with topics or concepts important for understanding the week's lab activity. Students are introduction to skills or concept through the use of videos, activities, and other links to external resources. Student comprehension and preparation for lab is assessed with a short online quiz.

Supplemental Instruction
The use of Supplemental Instruction (SI) to support student learning in the lower division core has been expanding in the past five years. In the SI program, students who have demonstrated mastery of the course concepts for Biology 171 and 172 (based on performance in those courses) can apply to serve as SI leaders. These students not only provide peer-mentoring for students struggling with course concepts, but they also serve as role models of successful students. Each SI leader is responsible for planning and implementing weekly sessions that support student learning. In the fall of 2014, SI sessions were offered for the first time for students enrolled in Biology 101, General Biology for non-majors. The data collected indicate that students participating in SI do 0.5-1.0 grade point better than students who do not. These results have been replicated across courses and colleges at CSUF, but course GPAs and pass rates have shown minimal if any improvement.

D. Describe other quality indicators identified by the department/program as evidence of effectiveness/success other than student learning outcomes (e.g. graduation rate, number of students attending graduate or professional school, job placement rates, etc.).

1) Scientific Communication
One of the department's student learning outcomes (SLO III) focuses on communication of science. All students are required to present research in oral, written, and visual forms in introductory and upper division biology courses. However, the department also tracks student presentations at conferences and manuscript co-authorship. CSUF biology students regularly

attend regional and national conferences, such as the Southern California Academy of Sciences and the Society for the Advancement of Chicano and Native American Students annual meetings. We record the number of students who attend conferences, present research in poster or oral presentations, and win awards for those presentations. CSUF biology students also publish independent and collaborative research in scientific journals. We track the number of undergraduate and graduate authors who publish in scientific journals each year.

2) Independent Research
Students regularly apply for departmental, university, and external grants, scholarships, and research programs. Successful applications demonstrate the overall success of the department in supporting student learning in biology, particularly SLOs I - IV. The department surveys faculty annually to monitor the number of successful student applications.

3) Community Engagement
We value student engagement on campus and in the community (SLO VI). The department records the number of students engaged in on-campus organizations, such as the Biology Club, volunteer activities, and service learning opportunities. Students that register with the Center for Internships and Community Engagement track their volunteer hours with off-campus partners; the department has access to those data as well.

E. Many department/programs are offering courses and programs via technology (e.g. on-line, etc.) or at off campus sites and in compressed schedules. How is student learning assessed in these formats/modalities?

Departmental offerings of online courses are limited to general education, non-majors courses, Biology 101- Elements of Biology and Biology 360 – Biology of Human Sex. We do not currently have a formal plan for the assessment of these courses beyond the use of course-based assessments of student learning and the traditional Student Opinion Questionnaire (SOQ) that is used in all of our courses. Biology 360 was evaluated by the *Quality Online Learning and Teaching* (QOLT) program that is part of the CSU eCATALST program from the CSU Office of the Chancellor.

IV. <u>*Faculty*</u>

A. Describe changes since the last program review in the full-time equivalent faculty (FTEF) allocated to the department or program. Include information on tenured and tenure track faculty lines (e.g. new hires, retirements, FERP's, resignations, and how these changes may have affected the program/department's academic offerings. Describe tenure density in the program/department and the distribution among academic rank (assistant, associate, professor) (Attach faculty vitae see Appendix VII).

The Department's recruitment and search processes have resulted in successful hires during the review period of 15 research-active, student-centered, tenure-track faculty, including several who specialize in biological education research (DBER – discipline-based education research).

Hope Johnson, a molecular microbiologist, **Melanie Sacco**, a plant molecular biologist, **Nikolas Nikolaidis**, a molecular bioinformaticist, and **Alison Miyamoto**, a cell and developmental biologist started in 2008 and all have earned tenure; followed in Spring 2009 by **Jennifer Burnaford**, a marine ecologist, who has now earned tenure; followed in Fall 2011by **Joel Abraham**, a Biological Science Education Researcher, who has now earned tenure; followed in Fall 2012 by **Kristy Forsgren**, a reproductive physiologist and toxicologist, and in Spring 2013, **Christopher Tracy**, a comparative physiologist and herpetologist; followed in fall of 2013 by **Veronica Jimenez**, a cell biologist and eukaryotic microbiologist who studies the protozoan parasite responsible for Chagas disease and **Catherine Brennan**, a cell biologist; followed in fall of 2014 by **Misty Paig-Tran**, who studies biomechanics and functional morphology; and in 2013-14 we searched for population geneticists and hired **Joshua Der**, **Parvin Shahrestani**, and **Ryan Walter**, all of whom started in during the 2015 calendar year because the reconstruction of research lab and office space was delayed. We searched for a developmental biologist in 2015-2016 but this search was ultimately unsuccessful.

These new faculty constitute close to half of the department's tenured/tenure-track faculty, but the total number of tenured/tenure-track faculty over the review period only increased from 24 to 33 (representing 69% of our total Full Time Equivalent Faculty, FTEF). On average 14 FTEF per year are used to fund graduate assistants, and teaching associates. At the beginning of this review period we had a total of 24 full-time faculty (including FERP and Lecturers), whereas in 2015-16 we had 33, yet the number of undergraduate majors and graduate students increased from 842 to a maximum of 1418 in AY 13 – 14 and in AY 15-16 was 1221.5 and FTES increased from 874 to a maximum of 1057 in AY 13 – 14 and in AY 15-16 was 950.2. During the review period we only have increased 9% (874.3 to 950.2) in FTES and 44% (888 to 1279) in headcount. This discrepancy was caused by the recent reduction in units in our lower-division core classes to reduce structural bottlenecks and a waiver of GE Area B2 (BIOL 101) for many of the high-unit majors in the College of Engineering and Computer Science. The department's enrollment in GE courses is likely to continue to drop with the addition of ANTH 101 to GE Area B2.

B. Describe priorities for additional faculty hires. Explain how these priorities and future hiring plans relate to relevant changes in the discipline, the career objectives of students, the planning of the university, and regional, national or global developments.

We have currently filled almost 70% of our FTEF with full-time faculty and our FTES is dropping. While we desperately need more tenured or tenure-track faculty to provide students faculty-mentored research experiences and increased access to other high-impact practices, to advise majors, mentor student clubs, design curriculum and develop new programs, conduct assessments, and seeking external funding, we cannot hire more faculty unless we receive additional space and funds to reconfigure and renovate current space for faculty offices and research laboratories, adequate start-up equipment funds, funds to maintain current shared research facilities, and a CSUF-wide commitment to a strong and sustainable research culture. We have two areas of need based on our curriculum and student interest. We need faculty with an interest in cell biology and/or physiology. These faculty are needed to teach in our introductory core course sequence and to teach upper division required courses in the curriculum.

C. **Describe the role of full-time or part time faculty and student assistants in the program/department's curriculum and academic offerings.** ***Indicate the number and percentage of courses taught by part-time faculty and student teaching assistants. Identify any parts of the curriculum that are the responsibility of part-time faculty or teaching assistants.***

The full-time faculty are involved in teaching majors and non-majors courses (General Education Courses and Service Courses – e.g. Anatomy and Physiology for Allied Health Professions). Tenure Track Faculty and Full Time Lectures (collectively Full-Time Faculty) teach in General Education and the Major. Tenure Track Faculty also teach and mentor graduate students. Part-time lecturers teach lower and upper division courses in the Major, General Education, and Service Courses. Tenure track faculty teach much more in the major and the graduate program than do the lecturers.

General Education and Service Courses are overseen by Dr. Merri Lynn Casem, Director of the Non-Majors Biology Program and Dr. Carol Chaffee, Coordinator of Elements of Biology (101). Both Dr. Casem and Dr. Chaffee work closely with the lecturers and tenure track faculty who teach non-majors courses. In addition, Dr. Megan Tommerup, a FTL, specifically coordinates the BIOL 102 Biology for Future Teachers course and BIOL 453 Life Science Concepts that are taken by prospective elementary teachers.

Teaching Associates (TA) and instructional student assistants (ISA) teach majors and non-majors (General Education and Service) in our lower- and upper-division courses with multiple sections of laboratories. All TAs must take BIOL 500C, Professional Aspects of Teaching. In this course, they learn a variety of teaching techniques and are given specific assignments to employ them in their courses. Faculty members function as laboratory coordinators and, along with permanent staff, work closely with the TAs in the planning of each lab session and oversee assessment of student products.

Full time faculty generated 38-50% of our FTES and accounted for 36% of the total enrollment and taught 47-50% of sections in Fall 2015 and Spring of 2016. Lecturers taught 22% of sections, 40-44% of the enrollment and 48-50% of the FTES. Teaching associates taught 25-31% of sections, 21-24% of the enrollment and 11-12% of the FTES. These data are summarized on the next page.

The number of faculty, student enrollment, and FTES for each type of course and appointment are shown below.

Appointment & Course Category	Number of Sections Fall 2015	Number of Sections Spring 2016	Enrollment Fall 2015	Enrollment Spring 2016	FTES Fall 2015	FTES Spring 2016
Full-Time Faculty						
General Education	3	4	272	261	54.4	52.2
General Education & Major (151/152)	3	3	456	433	91.2	84.7
Service	1	0	114	0	22.8	0
Major	29	30	1416	1319	216.3	195.4
Graduate	27	28	178	176	23.6	22.7
Part Time Lecturers						
General Education	14	13	1934	1778	360.1	327.5
General Education & Major (151/152)	0	4	0	151	0	10.1
Service	5	4	304	239	55.9	40.1
Major	11	11	480	522	68.6	83.1
Teaching Associates						
General Education	10	8	353	345	23.5	23
General Education & Major (151/152	10	6	456	264	30.4	17.6
Service	3	4	117	146	7.8	9.7
Major	19	15	686	522	62.2	46.1

D. Include information on instructor participation in Special Sessions self-support programs offered by the department/program.

Faculty participate in Special Sessions self-support programs for summer and intersession. For summer we generally offer the following GE/service courses: BIOL 101 – Elements of Biology, BIOL 310 & 310L – Human Physiology and Lab, BIOL 453 – Life Science Concepts, and one to three majors courses depending on interest and availability of instructors. During intersession we regularly offer BIOL 101 BIOL/GEOL 336 –Geo/Bio Field Investigations, BIOL 414 Microbial Genetics, BIOL 482 – Capstone Studies in Biology, and BIOL 490 – Advances in Clinical Microbiology. 490 BIOL/GEOL 336, BIOL 482, and BIOL 490 represent new study away/abroad opportunities for our faculty. These have generally been successful based on feedback from students and faculty.

Student Support and Advising

A. Briefly describe how the department advises its majors, minors, and graduate students.

Advising is available to students for several weeks each semester and during faculty office hours throughout each semester. During the fall semester, advising is mandatory for all majors, whereas in the spring semester, advising is mandatory for certain majors (first-time freshmen or recent transfer students who entered in the fall, candidates for graduation in summer or fall, and students on academic probation) and is optional for all other majors. After students have attended mandatory advising, their registration hold is released. First-time freshmen are advised in group sessions led by members of the Undergraduate Advancement Committee. These group advising sessions provide information on the major, guidance on the sequence of classes to take, and career resources, and encourage students to take individual responsibility for understanding the requirements of the major. Non-freshmen are assigned to meet with an individual faculty adviser. Outside of the advising period, students have access to a Biology advising website with advising resources (such as FAQ and a worksheet for freshmen and new majors to plan their courses), as well as an email address for advising questions. Students in minors are advised upon request. Graduate students work with their thesis committee to create a study plan and meet with their thesis adviser for advising to release their registration hold each semester.

B. Describe opportunities for students to participate in departmental honors programs, undergraduate or graduate research, collaborative research with faculty, service learning, internships, etc. ***How are these opportunities supported? List the faculty and students participating in each type of activity and indicate plans for the future.***

We have 30 tenured and tenure track faculty and well over 1200 majors. Having all of our students participate in an intensive research experience under the close guidance of a faculty mentor is impossible given our resource and space constraints. We do provide capstone experiences in 400 level courses, study abroad/away opportunities, and are working to provide course based undergraduate research opportunities early in the major.

To increase the number of students involved in faculty-mentored research and expose students to research and professional development opportunities earlier, the Department has:

- hired a total of 15 student-centered, research-active faculty representing important and integrative subdisciplines, all of whom are mentoring both undergraduate and MS research students.
- initiated and supported the **Research Careers Preparatory (RCP) program** which addresses the need for exposing students to research earlier and providing a more robust pipeline of students prepared for our funded research-training Scholars programs noted below.
- initiated the **Biology Undergraduate Research Scholars Training Program (BURST)**, and the **BURST Freshman Orientation Research Training Hour (BURST FORTH)**. The goals of BURST were to (a) increase the number of students involved in the high-impact practice of faculty-mentored research, (b) improve student understanding of the nature of science, (c) engage students with biology research early in their careers, and (d) build a

community of student researchers, with the overarching goal of improving retention and graduation rates. BURST FORTH introduced an authentic research experience, based on ongoing biology faculty-student research projects, to incoming freshmen during three days of New Student Orientation, with the goal of making connections with people, places, and activities the freshmen will encounter as part of our biology department community.

- implemented three new externally funded student research scholars programs: the **Howard Hughes Medical Institute (HHMI) Research Scholars Program** in collaboration with the Department of Chemistry and Biochemistry, which also includes community college and high school components, the **USDA NIFA-funded Urban Agriculture Community-based Research Experience (U-ACRE) program**, a multi-disciplinary research training program in collaboration with the Department of Anthropology, and the **Bridges to Stem Cell Biology (BSCR) program** supported by the California Institute for Regenerative Medicine (CIRM), which join the ongoing NIH-funded **Maximizing Access to Research Careers (MARC)** and **Minority Health and Health Disparities International Research Training (MHIRT)** Programs and the **Southern California Ecosystems Research Program (SCERP)** which was funded by NSF and is now partially funded with philanthropic support, to support immersive faculty-mentored research experiences.
- participated in the Department of Education-funded **(STEM)^2 program (Strengthening Transfer Education and Matriculation in STEM)** that partners with three feeder community colleges and supports summer research experiences for community college students, and initiated mandatory transfer advising in summer.
- made students aware of additional research opportunities outside of CSUF.
- partnered with student groups, including the **Biology Club, Biology Graduate Student Club,** and **Students United with Community Collaborators to Enhance Success in Science (SUCCESS)**, to provide leadership, mentoring, and community-building opportunities.

The Department also actively participates in the **CSU Program for Education and Research in Biotechnology (CSUPERB), the CSU Council on Ocean Affairs, Science and Technology (COAST), the Water Resources and Policy Initiatives (WRPI), the Ocean Studies Institute (OSI),** and **the California Desert Studies Consortium (CDSC)**, all of which are CSU research and education consortia that offer research opportunities and/or support for undergraduate and graduate students, as well as our faculty.

Unfortunately HHMI is no longer funded and BURST was funded through the Provost's office. We do not have additional funding to continue either program. These programs require funding to support students (e.g. stipends and supplies) and assigned time for the faculty involved as mentors and those administering the program.

V. *Resources and Facilities*

A. Itemize the state support and non-state resources received by the program/department during the last five years.

State Support

Faculty, Teaching Associate, and Graduate Assistant Salaries are the largest portion of our spending. Our spending on full time faculty as risen by 33% as would be expected based on raises as well as hiring more full-time faculty, both tenure track and lecturer. Our spending associated with teaching associates increased by a much smaller amount. However, changes to their contract will continue to increase this cost because of changes in pay associated with field trips and several planned raises. Our lecturer costs have also increased but have been slowly decreasing starting in 2015-2016. These have also increased as a result of raises, the need to hire faculty with PhDs to substitute for tenure track faculty in upper division courses, and that we have had to use lecturers to teach laboratory sections of required courses. These data are available in Appendix 4.

Operating Expenses - Equipment, Supplies, and Student Assistants

Although it looks as if our Operating Expense Budget has increased, at the beginning of this PPR period, the department had been allowed to carryforward dollars in order to save for renovations, equipment purchase and repair, and contingencies. In 2009-2010 that was no longer allowed and we spent down that money over the course of several years. In fiscal year 2008 -2009 we had an additional $391,285 available from carryforward and lottery funds. We no longer have those. In recent years, we spend almost all (or more) of our Operating Expense budget and are struggling to replace equipment (see section B) and provide adequate funds to support faculty student research. We are able to provide approximately $1,000 per faculty member for research and travel and all faculty need much more than that to support student research and the students' ability to travel to conferences and present. While our faculty have been very successful obtaining grants (see below), bridging faculty between grants can be difficult even with the CSUF intramural grant programs. More support for faculty student research is needed to ensure the success of faculty and students.

In fiscal year 2008-2009 Biology department faculty were PIs on 6.8 million dollars of submitted proposals and obtained 3.2 million dollars of funding. In 2015-2016 the department requested 15.5 million dollars of extramural funding and obtained 7.7 million dollars of funding. In addition, the department has almost doubled the number of submissions (24 in 2008-2009 and 45 in 2015-2016).

At the end of FY 2015-2106, we had $562,240 in philanthropic accounts and only 2.3% was not designated towards a specific scholarship or program. $406,670 is in various endowments for scholarships. We receive $5,000 to $15,000 per year from donors (on average) and almost all of those dollars are to support student scholarships or fellowships.

B. Identify any special facilities/equipment used by the program/department such as laboratories, computers, large classrooms, or performance spaces. Identify changes over last five years and prioritize needs for the future.

Rather than list every item, I have tried to provide summaries and gone into more detail on items that are in dire need of replacement.

Faculty have assigned research space (~ 600 ft^2) and receive start-up funds to equip their laboratories, which are located in McCarthy Hall (MH) or Dan Black Hall (DBH). While our research labs are well equipped, the equipment is aging and faculty who have active funded labs do not have enough space to support students or add equipment that they need. We have several shared facilities that are utilized by faculty, including high-speed and ultra-centrifuges, -80^{o}C freezers, a BioRad real-time PCR machine, Nanodrop spectrophotometer, microplate readers, temperature-controlled incubator-shakers, autoclaves, a cell-culture facility with tissue culture hoods and an inverted microscope, Milli-Q water, gel documentation stations, fluorescence microscopes, a walk-in cold room, and temperature controlled rooms in McCarthy Hall as well as several incubators in MH and DBH. The department also has shared space to maintain teaching collections of invertebrates (marine and terrestrial), algae, plants, and vertebrates. In addition, we have animal care facilities that can support mammals, reptiles, marine invertebrates and vertebrates, freshwater fish, and terrestrial invertebrates.

The department maintains five teaching laboratories in DBH and nine in MH. Many of the teaching labs in MH are in dire need of redesign and renovation (mentioned in our last PPR). We also have an instructional computer laboratory that has 20 workstations and is used to teach upper division courses in statistics, bioinformatics, and population genetics.

We have five vehicles and need to replace three. The oldest, a Dodge pickup purchased in 1998 is used only by staff locally and has travelled almost 200,000 miles. The others, a 2005 Ford pickup (>200,000 miles) and a 2007 Chevrolet pickup (>150,000 miles). These are used extensively by faculty and staff for field trips in support of instruction and research. We estimate that $150,000 will be required to replace these vehicles. We do not have the resources to replace these at this time.

We have retrofit our Microscopy Facility in 2015 to use as a microscopy teaching lab; BIOL 418L taught there in Spring 2016. This lab contains:

- Hitachi H-7000 Transmission Electron Microscope (as of October 2015, this is no longer functional)
- Hitachi S-700 Scanning Electron Microscope
- Leica TSP AOBS Scanning Confocal Microscope (instrument is no longer supported by Leica)
- Olympus BX61 Epi-fluorescence Microscopes with Kodak digital video cameras and image analysis software
- Life Cell quick freeze device
- Ultramicrotomes, glass knife makers, diamond knife, etc.

We have written a Major Research Instrumentation proposal to replace the SEM and were

unsuccessful. We have written an MRI proposal to replace the confocal scope. These items are used by our faculty and students in classes and in their research. To replace the Confocal, TEM, and SEM will be between $1,000,000 – 1,500,000 which, as one can imagine, the department does not have.

The Greenhouse Complex was constructed at the same time as McCarthy Hall. While we are able to make it work, the facility needs renovation as discussed in our last PPR. The Greenhouse plays a vital role in our department both for educational and research purposes and, as was mentioned in our last PPR, there is still no funding to renovate the facility.

C. Describe the current library resources for the program/department, the priorities for acquisitions over the next five years and any specialized needs such as collections, databases etc.

The current library resources are adequate as long as the interlibrary loan system continues to be efficient and quick.

VI. *Long-term Plans*

A. Summarize the unit's long-term plan, including refining the definitions of the goals and strategies in terms of indicators of quality and measures of productivity. (See instructions, Appendix VI)

B. Explain how long-term plan implements the University's mission, goals and strategies and the unit's goals.

C. Explain what kinds of evidence will be used to measure the unit's results in pursuit of its goals, and how it will collect and analyze such evidence.

D. Develop a long-term budget plan in association with the goals and strategies and their effectiveness indicators. What internal reallocations may be appropriate? What new funding may be requested over the next seven years?

The Department of Biological Science plans to remain student-centered and to develop and implement programs and activities that enhance student learning and success. The department is committed to the importance of learning science by doing science and using hands-on and investigative instructional approaches, providing all students with opportunities for faculty-mentored student research or internships, and maintaining and strengthening the department's and university's support for research because of its importance in recruiting and retaining excellent faculty, maintaining currency in the discipline, and engaging students in hands-on learning to develop essential skills. We will build on our successes and strengths and seek resources to implement or expand effective student-centered programs that meet the Department's goals (page 4) and align with the University's goals and Strategic Plan.

Our priorities (not in any particular order) for the next review period will be:

Curriculum, Advising, and Assessment

1) Evaluate predictors of success in our first course, BIOL 151 to identify interventions beyond what we are currently doing. This may require additional funds depending on the intervention.
2) Identify and remedy barriers to graduation based on course availability and rotations.
3) Evaluate the impact of the current curriculum revisions on student learning in the undergraduate degree program.
4) Collaborate with the Mathematics Department to determine how best to improve students' mathematics and quantitative skills.
5) Improve undergraduate student advising by creating a new full-time staff position (ideally a biology alumnus/a), to answer students' advising questions, address straightforward issues and refer more complex issues to faculty or bioladvising@fullerton.edu, and coordinate our summer orientation and advising programs.

Access to and Support for High Impact Practices

1) Increase student access to opportunities for faculty-mentored research, academic internships, study-away/abroad and integrative or interdisciplinary capstone experiences.
2) Expose students earlier to the multiple career options in Biology and paths leading to those careers. Provide more structured career advising to students throughout their time at CSUF, and establish a space for students, faculty, and staff to work together, build community, and participate in workshops on topics such as careers, professional development, leadership, and research ethics.
3) Explore and potentially develop course-based research experiences for undergraduates that can occur at scale and increase student engagement and persistence in the major. Implementation of this practice will require significant investment to remodel existing spaces and increased support and resources for faculty research and equipment.

Diversify and Increase the Size of the Department Faculty & Staff

1) Hire at least two additional faculty over the next three years and replace all retirements and separations. In order to be competitive with other CSUs this will require start-up of $200,000 to $300,000 and renovation of space in MH. After two additional hires we will have no laboratory or office space available.
2) Hire at least one additional staff member for advising (see above) and replace all retirements and separations. The department also requires support for outreach, web design and content, and social media.

Infrastructure and Equipment

1) Participate in the development and planning of the renovation of McCarthy Hall.
2) Develop an Equipment Replacement Plan and Priority List: We have aging equipment that must be replaced. During the financial downturn and constant budget cuts, we have not been allowed to carry-forward money and save to replace expensive equipment (e.g. vehicles, freezers etc.)
3) Work with the Dean's Office and Academic Affairs to change policies so that savings can be carried forward into the next year to aid in equipment purchase, repair, and replacement.

4) Refurbish (redesign and rebuild would be best) the teaching labs in McCarthy Hall. These labs and the furniture are so old that the countertop colors rub off and the countertops must be waxed to keep student's arms from turning black. In addition, these labs are not ideal learning spaces. I estimate that this will cost between $ 250,000 – 400,000 per lab.

Grants, Contracts, and Philanthropic Funds

1) Continue to seek external funds to support our mission and goals and so that we may increase external funding levels.
2) Increase department engagement with Alumni and Donors.
   Meets CSUF Goal 4 and will help us to meet the other goals.

Outreach and Recruitment

1) Develop and outreach and recruitment plan for the graduate and undergraduate program.
2) Increase our MS program enrollment to 75 or more students.
3) Increase outreach and recruitment efforts for the following concentrations:
   a. Ecology and Evolutionary Biology
   b. Marine Biology
   c. Plant Biology

Graduate Student Support

1) Increase support for MS students, by advocating for tuition waivers for all teaching associates (TAs) and graduate assistants (GAs).
2) Increase funds available to support graduate student research supplies, travel, and summer research stipends.
3) Demonstrate the added benefit graduate students bring to undergraduate education.

Planning and Evaluation

The department has not had sufficient time to engage in long-term planning for a number of years and that must be a priority. The Department should:

1) Perform a SWOT analysis.
2) Evaluate our department and program using the PULSE Vision and Change Rubics. These assess the departments alignment with the Vision and Change initiative and can help inform us of our strengths and areas for improvement. The rubrics can be viewed here https://www.dropbox.com/s/i6bgjcyhrlciu15/PULSERubricsPacketv2_0_FINALVERSION.pdf?dl=0
3) Develop a strategic plan during 2018-2019 that will align with the new University Strategic Plan to be unveiled during the summer of 2019. This plan should include our hiring, curricular, and infrastructure priorities for the next seven years.

Community Building (revised from our last PPR)

1) Foster a sense of community to assure that faculty, students, and staff have as a common purpose the achievement of the goals of the Department.
2) Provide an environment that enhances the productivity of faculty and staff and encourages cooperation and interaction in meeting the Department's mission, goals and strategies.

3) Encourage faculty involvement in departmental governance, while making effective use of faculty time and streamlining decision making processes.
4) Enhance communication between faculty, staff, and students through the use of information and analog (i.e. walking to someone's office) technologies.
5) Plan department social events and research colloquia.

VII. *Appendices Connected to the Self-Study (Required Data)*

1. Undergraduate Degree Programs
2. Graduate Degree Programs
3. Faculty
4. Resources
5. Long-term planning
6. *Curriculum Vitae* of faculty (which should include recent scholarly/creative activity and any research funding)

APPENDIX 1. UNDERGRADUATE DEGREE PROGRAMS

TABLE 1. Undergraduate Program Applications, Admissions, and Enrollments

For each undergraduate degree program, a table will be provided with the number of student applications, number of students admitted, percent admitted, the number of new enrollments, and the percentage of new enrollments. Percentage of students enrolled is the number of students enrolled divided by the number of students admitted or the yield rate.

TABLE 1-A. First-time Freshmen: Program Applications, Admissions, and Enrollments

Academic Year	# Applied	# Admitted	% Admitted	# Enrolled	% Enrolled
2007-2008	1484	1055	71%	130	12%
2008-2009	4549	1096	71%	158	14%
2009-2010	4647	1043	63%	187	18%
2010-2011	2081	1359	65%	243	18%
2011-2012	2343	1472	63%	302	21%
2012-2013	2886	1852	64%	360	19%
2013-2014	2935	1937	66%	345	18%
2014-2015	2956	1601	54%	225	14%
2015-2016	2861	1563	55%	246	16%

TABLE 1-B. Upper Division Transfers: Program Applications, Admissions, and Enrollments

Academic Year	# Applied	# Admitted	% Admitted	# Enrolled	% Enrolled
2007-2008	427	232	54%	111	48%
2008-2009	358	179	50%	85	47%
2009-2010	289	131	45%	70	53%
2010-2011	775	355	46%	148	42%
2011-2012	684	312	46%	114	37%
2012-2013	666	384	58%	126	33%
2013-2014	850	352	41%	123	35%
2014-2015	889	214	24%	75	35%
2015-2016	723	164	23%	72	44%

TABLE 2. Undergraduate Program Enrollment in FTES

For each undergraduate degree program, a table will be provided showing student enrollment for the past five years, including lower and upper division enrollment.

TABLE 2-A. Undergraduate Program Enrollment in FTES

Academic year	Enrollments in FTES			
	Lower-Division FTES[1]	Lower- Division FTES by Majors Only[2]	Upper-Division FTES[3]	Upper- Division FTES by Majors Only[4]
2007-2008	589.5		283.2	
2008-2009	588.7		255.3	
2009-2010	608.3	120.4	247.5	145.1
2010-2011	608.7	132.7	220.8	120.5
2011-2012	660.0	149.7	227.5	131.3
2012-2013	719.6	169.9	240.3	145.9
2013-2014	773.0	193.5	246.3	145.2
2014-2015	779.4	194.3	257.0	169.7
2015-2016	718.8	179.9	246.8	171.3

[1] All students' FTES regardless of student major enrolled in Lower Division Courses of the program
[2] Students' FTES with the major enrolled in Lower Division Courses of the program
[3] All students' FTES regardless of student major enrolled in Upper Division Courses of the program
[4] Students' FTES with the major enrolled in Upper Division Courses of the program

TABLE 2-B. Undergraduate Program Enrollment (Headcount)

Academic Year	Majors			
	Lower Division	Upper Division (including Post-Bac & 2nd Bac)	Total	FTES per headcount
2007-2008	276.0	566.0	842.0	0.85
2008-2009	276.0	555.0	831.0	0.83
2009-2010	332.5	517.0	849.5	0.83
2010-2011	437.0	583.5	1,020.5	0.85
2011-2012	511.5	674.5	1,186.0	0.86
2012-2013	608.5	730.5	1,339.0	0.85
2013-2014	625.0	793.0	1,418.0	0.84
2014-2015	495.0	823.0	1,318.0	0.84
2015-2016	436.0	785.5	1,221.5	0.84

TABLES 3. Graduation Rates for Majors

For each undergraduate degree program, tables will be provided showing the graduation rates for majors. Table 3-A will summarize the freshman graduation rates. Table 3-B will summarize the graduation rates for transfer students.

TABLE 3-A. First-time Freshmen Graduation Rates for Majors

Entered In	Headcount	% Graduated in 4 years		% Graduated in 5 years		% Graduated in 6 years		% Graduated in 6 years plus 7th year persistence	
		in major	not in major	in major	not in major	in major	not in major	in major	not in major
Fall 2002	127	1.6%	5.5%	14.2%	16.5%	21.3%	19.7%	26.0%	25.2%
Fall 2003	141	1.4%	7.1%	9.9%	21.3%	15.6%	31.2%	17.0%	34.8%
Fall 2004	151	6.0%	8.6%	23.2%	17.9%	29.8%	22.5%	32.5%	27.2%
Fall 2005	163	4.9%	3.1%	18.4%	17.2%	20.2%	27.6%	22.1%	33.1%
Fall 2006	184	4.9%	3.3%	16.8%	22.3%	19.0%	32.1%	20.1%	38.6%
Fall 2007	127	2.4%	5.5%	11.8%	20.5%	15.7%	29.1%	18.1%	33.9%
Fall 2008	154	5.2%	2.6%	14.3%	20.1%	20.1%	29.9%	20.1%	29.9%
Fall 2009	179	3.9%	7.3%	16.8%	20.1%	26.3%	40.2%	26.3%	48.0%
Fall 2010	232	5.6%	3.4%	15.5%	20.7%				
Fall 2011	291	2.7%	9.3%						
Fall 2012	351								
Fall 2013	328								

TABLE 3-B. Transfer Student Graduation Rates for Majors

Entered In	Headcount	% Graduated in 2 years		% Graduated in 3 years		% Graduated in 4 years		% Graduated in 4 years plus 5th year persistence	
		in major	not in major	in major	not in major	in major	not in major	in major	not in major
Fall 2002	62	3.2%	1.6%	30.6%	9.7%	35.5%	9.7%	37.1%	9.7%
Fall 2003	55	7.3%	0.0%	25.5%	7.3%	38.2%	9.1%	40.0%	14.5%
Fall 2004	56	16.1 %	3.6%	28.6%	8.9%	35.7%	16.1%	44.6%	16.1%
Fall 2005	93	7.5%	2.2%	23.7%	6.5%	37.6%	10.8%	44.1%	16.1%
Fall 2006	112	3.6%	2.7%	25.0%	13.4%	33.9%	22.3%	37.5%	25.0%
Fall 2007	81	1.2%	1.2%	19.8%	9.9%	39.5%	16.0%	46.9%	19.8%
Fall 2008	46	4.3%	0.0%	21.7%	4.3%	39.1%	10.9%	39.1%	13.0%
Fall 2009	70	2.9%	1.4%	28.6%	5.7%	45.7%	14.3%	51.4%	15.7%
Fall 2010	99	7.1%	0.0%	31.3%	11.1%	36.4%	16.2%	42.4%	21.2%
Fall 2011	87	2.3%	1.1%	14.9%	5.7%	43.7%	13.8%		
Fall 2012	121	1.7%	1.7%	28.1%	9.9%				
Fall 2013	114	2.6%	3.5%						
Fall 2014	61								
Fall 2015	30								

TABLE 4. Degrees Awarded

For each undergraduate degree program, a table will be provided showing the number degrees awarded for the five most recent academic years for which data are available.

TABLE 4. Degrees Awarded

Academic Year	Degrees Awarded
2004-2005	125
2005-2006	108
2006-2007	113
2007-2008	115
2008-2009	140
2009-2010	141
2010-2011	138
2011-2012	130
2012-2013	137
2013-2014	145
2014-2015	183
2015-2016	192

APPENDIX 2. GRADUATE DEGREE PROGRAMS

TABLE 5. Graduate Program Applications, Admissions, and Enrollments

For each graduate degree program, a table will be provided showing the number of student applications, number of students admitted, the percentage of students admitted, the number of new enrollments, and the percentage of new enrollments. Percentage of students admitted is equal to the number of students admitted divided by the number of students who applied. Percentage of students enrolled is equal to the number of students enrolled divided by the number of students admitted.

TABLE 5A. M.S. Biology Program Applications, Admissions, and Enrollments

Academic Year	# Applied	# Admitted	% Admitted	# Enrolled	% Enrolled
2007-2008	84	28	33%	23	82%
2008-2009	91	28	31%	21	75%
2009-2010	71	25	35%	16	64%
2010-2011	87	30	34%	20	67%
2011-2012	84	27	32%	23	85%
2012-2013	61	20	33%	10	50%
2013-2014	71	23	32%	15	65%
2014-2015	75	25	33%	17	68%
2015-2016	73	33	45%	26	79%

TABLE 5B. M.S. Biotechnology Program Applications, Admissions, and Enrollments

Academic Year	# Applied	# Admitted	% Admitted	# Enrolled	% Enrolled
2009-2010	15	10	67%	7	70%
2010-2011	25	8	32%	5	63%
2011-2012	39	12	31%	7	58%
2012-2013	26	6	23%	5	83%
2013-2014	19	0	0%	0	
2014-2015	15	0	0%	0	
2015-2016	0				

TABLE 6. Graduate Program Enrollment in FTES

For each graduate degree program, tables will be provided showing student enrollment for the past five years.

TABLE 6-A. Graduate Program Enrollment in FTES

Academic Year	M.S. Biology FTES	M.S. Biotechnology FTES
2006-2007	24.8	
2007-2008	24.7	
2008-2009	31.8	
2009-2010	35.1	3.0
2010-2011	36.9	5.2
2011-2012	35.8	4.4
2012-2013	27.5	4.7
2013-2014	23.5	2.2
2014-2015	25.3	0.1
2015-2016	32.0	0.0

Table 6-B.1. M.S. Biology Program Enrollment in Headcount

Academic Year	Headcount majors				
	Master's	Doctoral	Credential	Total	FTES per headcount
2006-2007	54.0			54.0	0.5
2007-2008	54.0			54.0	0.5
2009-2010	56.5			56.5	0.6
2010-2011	59.0			59.0	0.6
2011-2012	62.0			62.0	0.6
2012-2013	61.5			61.5	0.6
2013-2014	49.5			49.5	0.6
2014-2015	45.5			45.5	0.5
2015-2016	47.0			47.0	0.5

Table 6-B.2. M.S. Biotechnology Program Enrollment in Headcount

Academic Year	Headcount majors				
	Master's	Doctoral	Credential	Total	FTES per headcount
2009-2010	4.0			4.0	0.8
2010-2011	11.0			11.0	0.5
2011-2012	7.5			7.5	0.6
2012-2013	11.0			11.0	0.4
2013-2014	6.0			6.0	0.4
2014-2015	0.5			0.5	0.3
2015-2016	0.0			0.0	

TABLE 7. Graduate Student Graduation Rates

For each graduate degree program, a table will be provided showing the graduate rate for Master's seeking students.

TABLE 7A. Graduation Rates for Master's-Seeking Students – M.S. Biology

All Master's Enrolled in:	Headcount	% Graduated in 2 years	% Graduated in 3 years	% Graduated in 4 years	% Graduated in 4 years plus 5th year persistence
Fall 2002	15	0.0%	13.3%	20.0%	33.3%
Fall 2003	21	0.0%	14.3%	38.1%	47.6%
Fall 2004	10	10.0%	20.0%	70.0%	80.0%
Fall 2005	19	5.3%	31.6%	52.6%	57.9%
Fall 2006	10	0.0%	20.0%	20.0%	40.0%
Fall 2007	16	18.8%	18.8%	31.3%	37.5%
Fall 2008	15	6.7%	46.7%	53.3%	80.0%
Fall 2009	16	0.0%	6.3%	50.0%	56.3%
Fall 2010	20	10.0%	30.0%	45.0%	70.0%
Fall 2011	21	4.8%	14.3%	42.9%	
Fall 2012	10	0.0%	30.0%		
Fall 2013	13	15.4%			
Fall 2014	15				
Fall 2015	23				

TABLE 7B. Graduation Rates for Master's-Seeking Students – M.S. Biotechnology

All Master's Enrolled in:	Headcount	% Graduated in 2 years	% Graduated in 3 years	% Graduated in 4 years	% Graduated in 4 years plus 5th year persistence
Fall 2009	7	57.1%	71.4%	71.4%	71.4%
Fall 2010	5	40.0%	80.0%	80.0%	100.0%
Fall 2011	7	85.7%	85.7%	85.7%	
Fall 2012	5	60.0%	60.0%		
Fall 2013	0				
Fall 2014	0				
Fall 2015	0				

TABLE 8. Master's Degrees Awarded

For each graduate degree program, a table will be provided with the number of master's degrees awarded.

TABLE 8. Master's Degrees Awarded

Academic Year	M.S. Biology	M.S. Biotechnology
2004-2005	10	
2005-2006	8	
2006-2007	17	
2007-2008	15	
2008-2009	11	
2009-2010	13	
2010-2011	7	4
2011-2012	15	3
2012-2013	14	8
2013-2014	18	3
2014-2015	17	
2015-2016	14	

APPENDIX 3. FACULTY

Table 9. Full-Time Instructional Faculty, FTEF, FTES, SFR

For the five most recent academic years, a table will be provided with the Number of Tenured Faculty, Number of Faculty on Tenure Track, Number of Faculty on Sabbatical, Number of Faculty in FERP, Number of Lecturers, Full-Time Faculty Equivalent (FTEF) Allocation, Full-Time Student Equivalent (FTES) Target, and the Actual FTES.

Note that Data on FTES Target and Actual FTES will be provided by the Office of Institutional Research and Analytical Studies.

Table 9. Faculty Composition

YEAR	Tenured	Tenure Track	Sabbaticals at 0.5	FERP at 0.5	Lecturers	FTEF Allocation	Actual FTES
2003-2004	13	11		5	0	39.5	782.8
2004-2005	13	10	2.5	5	0	40.5	788.9
2005-2006	13	10	1	4	1	44.6	883.5
2006-2007	14	8	1.5	2	1	44.9	891
2007-2008	14	8	1.5	2	2	43	862.5
2008-2009	17	8	1	2	2	43.5	874.3
2009-2010	17	10	2	1	2	42.3	854.1
2010-2011	15	8	3	0	2	47	914.4
2011-2012	15	9	0	0	1	49.54	986.6
2012-2013	16	8	0	2	1	57.4	1047.5
2013-2014	16	10	4	2	1	51.7	1057.5
2014-2015	18	10	2	2	1	51.01	991
2015-2016	21	10	2	2	2	47.5	950.2

APPENDIX 4. RESOURCES

Table 10. Provide a table showing for the past five years all department resources and the extent to which each is from the state-supported budget or from other sources, such as self-support programs, research, contracts and/or grants, development, fund-raising, or any other sources or activities.

Table 10a. Overall Summary of Department Spending/Budget – State Support

Fiscal Year	Full Time Faculty*	Teaching Associates and Graduate Assistants*	Part-Time Faculty*	Total PTF Blanket*	Operating Expenses & Student Assistants
2008-2009	$ 1,897,546.50	$ 481,230.81	$ 519,994.14	$ 1,001,224.95	$ 257,849.00[1]
2009-2010	$ 1,736,303.71	$ 458,765.71	$ 458,836.97	$ 917,602.68	$ 225,025.00
2010-2011	$ 1,753,804.24	$ 502,255.25	$ 412,103.49	$ 914,358.74	$ 251,532.00
2011-2012	$ 1,781,407.31	$ 475,546.89	$ 582,098.54	$ 1,057,645.43	$ 246,418.00
2012-2013	$ 1,768,040.00	$ 469,816.65	$ 646,197.95	$ 1,116,014.60	$ 344,299.54
2013-2014	$ 2,062,393.40	$ 445,215.82	$ 691,754.65	$ 1,136,970.47	$ 395,926.80
2014-2015	$ 2,171,189.34	$ 496,288.84	$ 858,239.77	$ 1,354,528.61	$ 387,478.00
2015-2016	$ 2,522,987.53	$ 499,510.77	$ 712,265.69	$ 1,211,776.46	$ 387,681.14

* This is the amount spent

[1] – the department also had $107,938 from lottery funds and $283,357 saved for equipment purchasing and maintenance which was carried forward. Those dollars were spent down over several years.

Table 10b. Extramural grant funding obtained by the department from 2008 – 2016

Fiscal Year	Total Extramural Grant Funds Obtained*
2008-2009	$ 3,607,446.00
2009-2010	$ 2,101,909.00
2010-2011	$ 2,922,421.00
2011-2012	$ 2,660,085.00
2012-2013	$ 2,441,149.00
2013-2014	$ 962,092.00
2014-2015	$ 266,946.72
2015-2016	$ 7,735,894.00

* this is the amount obtained during that year, grant funding may last for several years

APPENDIX 5. LONG-TERM PLANNING

The unit will need to first develop goals regarding student learning, scholarship, and service outcomes and then develop criteria for assessing whether they have been achieved. Important quality outcomes may include the definition and analysis of student academic work/achievement; impacts of research and scholarly activity on the discipline, the institution, and the community; impacts of service on the discipline the institution, and the community; and the marks of a successful graduate from a program in this unit.

Using the information provided in the appendices (e.g. graduation rates, and faculty composition, FTES enrollment), how do they inform and influence the long-term goals of the department or degree program?

See section VI for our current plans. We will engage in long-term planning over the course of the next year.

APPENDIX 6. FACULTY CURRICULUM VITAE

Include recent scholarly/creative active and any research funding obtained.

These are available here -
https://www.dropbox.com/sh/k5m391y8na795jx/AAABvDqvq_tcoUzVCem5F6tSa?dl=0