The Department of Biological Sciences offers the following degree programs:

- BA Biological Science
- BA Biological Science, Preparation for Teaching
- BA Life Science, Preparation for Teaching
- BA Life Science, Concentration in Biodiversity Stewardship
- BS Biological Science, Concentration in Ecology & Evolution
- BS Biological Science, Concentration in Marine Biology
- BS Biological Science, Concentration in Microbiology
- BS Biological Science, Concentration in Molecular Biology
- BS Biological Science, Concentration in Systems Physiology
- MA Biological Sciences
- MS Organismal & Conservation Biology
- MS Molecular Biology & Microbiology
- MS Physiology
- MBT Masters of Biotechnology (Special Sessions)
- Clinical Lab Scientist, Certificate Program (Special Sessions)

It consists of 14 tenured/tenured-tracked faculty, and 14 staff members, and serves 816 undergraduate majors, 49 graduate majors, and over 3,200 enrolled students across campus in Fall 2014. It operates several unique programs and institutes such as the Stem Cell Internships in Laboratory-based Learning program and the professionally accredited Clinical Laboratory Science program. It is a leader in biological sciences education and has a long history of supporting students interested in field studies, natural history, and conservation. Its curriculum centers around three key areas: (1) ecology and evolution, (2) anatomy and physiology, and (3) molecular biology and microbiology. It also offers four key service courses to other degree programs and seven general education courses in the GE Areas B2, B3, and E, and R.

Since the last review, the department developed a new assessment strategy and refined its course and curricular offerings, particularly with initiating BIOL 1A Foundations of Biodiversity and BIOL 1B Foundations of Cellular Biology and Physiology, with the renaming of the Conservation and Organismal area to Ecology and Evolution area, and with the restructuring of the Anatomy and Physiology area (by offering new capstone and elective courses). Using grant funding, it purchased instructional equipment for several important courses. It also developed new guidelines for tenure and promotion.

**Strengths**
- Teaching and research productivity of highly committed faculty members with 80 grants from varying sources totaling over $13 million over the period of review.
- Stewardship of SJSU biodiversity collections
- Unique programs and institutes within the department: Stem Cell Internships Laboratory-based Learning (SCILL), Clinical Laboratory Scientist (Medical Technology) Training Program, Clinical Genetic Molecular Biologist Scientist Training Program (CGMBS), Master of Biotechnology (MBT) Program, and Research by Undergraduates Using Molecular Biology Applications (RUMBA)
- Clinical Laboratory Scientist (CLS) students score above the average for university-based CLS training programs across the nation

Challenges
- Avoiding health and safety hazards due to outdated instructional and research equipment, instruments, and space
- Hiring and recruiting additional faculty at current FTES and student-to-faculty ratio
- Trend of low enrollment in several degree programs
- Increasing workload of faculty
- Ensuring assessment data aid of degree programs in enhancing the overall undergraduate and graduate curriculum

Next Steps
The final step in the program planning process is a meeting with Provost Feinstein (or his designee), AVP of Undergraduate Studies Jaehne, AVP of Research Stacks, Associate Dean of Graduate Studies Bruck, Associate Director of Institutional Effectiveness and Analytics Vang, Dean Michael Parrish, and Department Chair Jeff Honda. The faculty members of the department are also invited to attend. The department should contact staff in the Office of Undergraduate Studies to schedule the final meeting. An Action Plan for the department will be developed and agreed upon during the final meeting. The following topics of discussion are recommended by the Program Planning Committee:

- Renovate laboratory spaces to maintain research capacity and avoid health hazards is the top concern of the committee.
- Investigate the recent drop in number of degrees awarded.
- Determine the proper balance of the number of degree programs organized by faculty members with differing areas of expertise (including the possible elimination of BA Life Science, Concentration in Wildlife Stewardship).
- Determine if departmental T/TT faculty are adequate for current and emerging discipline areas.
- Increase flexibility for undergraduates to allow for exploring and shifting educational goals. Develop interdisciplinary coursework.
- Revise the undergraduate and graduate curriculum to maximize ability of students to gain experience through independent research projects.
- Clarify and possibly revise submitted departmental RTP guidelines. Current submitted guidelines do not adequately articulate what counts as overall success.
- Address workload impact resulting from teaching and student mentorship and increasing expectations of research and publication.
- Remove bureaucratic impediments to allow for proper attention to teaching courses, conducting research, and planning program improvements.
- Enhance assessment of PLOs.
- Submit GE assessment data.
- Review and assess teacher prep programs
- Continue to develop distinct Program Learning Outcomes and a sustainable assessment plan for its graduate programs.

Recommendation from the Program Planning Committee
The Program Planning Committee recommends acceptance of the Program Plan. The Program Plan provided a good examination of current and ongoing issues and an explanation of plans for subsequent reviewers. The PPC reiterates the following recommendations:

FA14 PPC Members
Brandon White (Chair), Associate Professor, Biological Sciences
David Bruck, Associate Dean of Graduate Studies
Melinda Jackson, Director of Assessment
Dennis Jaehne, AVP of Graduate and Undergraduate Programs
Yudhi Ahuja, Lecturer, Marketing and Decision Sciences
Peter Chua, Associate Professor, Sociology and Interdisciplinary Social Sciences
Amy D’Andrade, Associate Professor, Social Work
Jennifer DiNalo, Librarian, University Library
Adrienne Eastwood, Associate Professor, English
Noorein Inamdar, Assistant Professor, School of Management
Stoyu Ivanov, Assistant Professor, Accounting and Finance
Lili Luo, Associate Professor, School of Information
Clifton Oyamot, Associate Professor, Psychology
Anthony Raynsford, Assistant Professor, Art and Art History
Sabine Rech, Associate Professor, Biological Sciences
Nadia Sorkhabi, Associate Professor, Child and Adolescent Development
Wenbin Wei, Professor, Aviation
Mary Wilson, Lecturer, History
Diana Wu, Librarian, University Library

CC:
Jeff Honda, Chair, Biological Sciences
Michael Parrish, Dean, College of Science
Elaine Collins, Associate Dean, College of Science
Noelle Brada-Williams, Chair, Curriculum and Research
Marna Genes, AVP Academic Budgets and Planning
Appendix: Summary of Program Plan and Recommendations

Program Description
As leaders in the education of a highly trained and diverse scientific workforce, the mission of the Department of Biology is to provide a dynamic educational experience by engaging students in hands-on, inquiry-based learning activities at the bench and in the field. Through these experiences, students will gain a conceptual and experiential understanding of the biological sciences spanning from molecules to ecosystems.

The Program goals are to:

- Serve the diverse student population of our region.
- Educate students to be intellectually agile and technologically proficient.
- Provide students with intensive, rigorous laboratory and field experiences within the context of their regular coursework.
- Create individualized mentoring opportunities and state-of-the-art learning experiences within the context of our faculty research programs.
- Foster creativity, a sound theoretical foundation, and the ability to communicate effectively and interact cooperatively.
- Make substantial contributions to the scientific community through our research efforts and that of our students.

The Department of Biology currently has three BA programs: (Biological Science; Biological Science, Preparation for Teaching; and Life Science, Preparation for Teaching); one BS program in Biological Science, with five concentrations: (Ecology and Evolution; Marine Biology; Microbiology; Molecular Biology; and Systems Physiology); one MA program in Biological Sciences; one MS program in Biological Sciences, with three concentrations (Ecology and Evolution; Physiology; and Molecular Biology and Microbiology); and two undergraduate minors: (Biological Science; and Science).

The department offers 8 GE courses: [Area B2] BIOL 10, BIOL 20, and BIOL 21; [Area B3] BIOL/GEOL 150; [Area E] BIOL 54; [Area R] BIOL 101 and BIOL 110; and [Area Z] BIOL 100W.

Summary of Changes and Actions
Since the previous review in 2007, the Department of Biological Sciences has undertaken the following changes: a reorganization and restructuring of individual programs and curriculum, including reduction of majors to 120 units; conducted extensive assessments of PLO’s and student learning; created a document clarifying RTP expectations; and streamlined the curriculum by eliminating four emphases. Nevertheless, certain action plan items from the previous PPC letter to the provost have again reappeared as issues in the recent external reviewer’s report. In particular item “a” from the previous letter - “Eliminating or combining concentrations and/or programs with very low enrollment, so as, at a minimum, to allow scheduling of each course offering at least every two years -” still seems just as relevant as an issue to be resolved. This point connects with the larger observation that individual programs and the faculty managing them are still unduly ‘silied.’ The external reviewer also suggested that the current RTP document is in need of further revision.
Assessment of Student Learning

The Biological Sciences department has engaged in serious review and revision of its curriculum over the last few years, including an updating of its assessment plan and processes. It has made great progress in mapping and aligning its curriculum to Program Learning Outcomes (PLOs), and University Learning Goals (ULGs), and developing effective and sustainable assessment goals.

The department has also devoted significant resources to student tracking and assessment, including the procurement of two NSF grants to support these activities. In response to the last program plan recommendations, a multi-methodological evaluation of BIOL1A-1B was also conducted between 2009-12 by an external assessment expert, which led to the reinstitution of co-requisite courses and the involvement of more tenured/tenure-track faculty in teaching these courses.

The department has utilized the national “Vision and Change in Undergraduate Education in Biology” document as a guide for aligning its curriculum with national standards. Efforts have also been made to engage the full department faculty in ongoing curriculum and assessment review through regular discussion of assessment processes and results. From such examples it is clear that this program is taking assessment seriously and has made great strides in this area since the last program review.

Overall, on the WASC Rubric for Assessing the Quality of Program Learning Outcomes, the Biology department programs fall between the Emerging and Developed categories at this point. The Comprehensive List criterion falls into the Developed category. To move toward the Highly Developed category, a more explicit statement of how mastery of each PLO will be assessed should be incorporated. As the department already notes in its 2013-14 annual assessment reports and program planning review, further development of distinct PLOs and assessment plans for its graduate programs are also needed. On the Assessable Outcomes criterion, the program currently falls into the Emerging category. To move toward the Highly Developed category over the next planning cycle, the department could focus on making the PLOs more clearly assessable by indicating the specific ways in which students will “demonstrate” each listed outcome, or by using more specific learning verbs in describing PLOs such as “analyze,” “describe,” “formulate,” or “explain,” for example. It would also be helpful to more clearly describe how the various assessment tools and rubrics included in the report appendices are being used to measure specific PLOs. The Alignment of curriculum with PLOs is Highly Developed, reflecting the significant effort that has been put into developing this area over the last few years. The current Assessment Planning falls into the Developed category. While a multi-year assessment plan has now been developed and is beginning to be implemented, over the next planning cycle the programs may wish to further develop and describe the ways in which assessment data will be used to make changes and improvements. Finally, the Student Experience criterion is currently in the Emerging category, as with many programs across the university at this point in time. The department has already identified the need to develop a more effective alumni tracking system which should prove useful for collecting feedback from
graduates over time. It may also wish to focus on increasing student familiarity with PLOs during their time in the programs and incorporating more student feedback on these learning outcomes and self-assessment.

**Required Data Elements**
The analysis is based on the data of Appendix A in the department program planning report. Except for the SFR for university, all other data for college and university norms are extracted from the website.

In AY2012-13, the department offered 69 courses and 163 sections for undergraduate classes and 22 courses and 88 sections for graduate classes. The average headcount per section for undergraduate courses was 98.8 for lower division, 18.6 for upper division and 4.6 in the graduate program. The average headcount per section for the department in AY 2012-13 is 26.4, which is similar to the college norm (26.4 in FA12, and 24.2 in SP13) but slightly higher than the university norm (25.8 in FY12, and 24.3 in SP13). The average headcount per section for graduate courses (4.6) is similar to the college norm for graduate courses (5.5 in FA12, and 4.4 in SP13) but lower than the university norm (12.3 in FA12, and 10.9 in SP13). The SFR (24.4) is slightly lower than the college (26.4) but higher than the university (21.4) norm, with an FTES of 674.6 and FTEF of 27.9. The induced load matrix shows that many other majors take their classes, as expected for a department teaching GE courses.

In AY2012-13, the department accepted 59% of the 1,553 students who applied as first-time freshmen. However, 6% of those students actually enrolled in classes and of that 6%, only 10% showed up. The department accepted 44% of the 370 students who applied as new undergraduate transfer. 12% of those students actually enrolled in classes and 28% of those 12% showed up. The department also accepted 26% of the 191 students who applied as first-time graduate. 26% of those students actually enrolled in classes and 100% of those 26% showed up. In FA12, there were 913 majors in the department, 806 of whom were undergraduates and 107 of whom are graduate students. The numbers of majors remain relatively stable from FA08 to FA12. The department awarded 51 undergraduate and 10 graduate degrees in AY2012/13. The numbers of degrees awarded remained relatively stable from AY2008/09 to AY2011/12, but there was a big drop in AY 2012/13. The total number of bachelor degrees awarded has been decreasing from 111 in AY2011/12 to 51 in AY2012/13. The total number of master degrees awarded has been decreasing from 42 in AY2011/12 to 10 in AY2012/13.

For the FA12 cohort, retention rates for first-time freshman was 89.6% of 96 students which is similar to the college norm (90.6%) but higher than the university norm (87.0%). Retention of transfer students was 79.1% (43 students), which is lower than college (87.2%) and university (86.2%) norms.

For the FA07 cohort, graduation rate for first-time freshman (6-year) was 48.6% (144 students), which was higher compared to college (18.3%) and university (46.1%).
Program Resources

In spring 2014 the Department of Biological Sciences had 29.9 FTEF faculty members, of whom 14.9 were tenured, 4 were probationary, and 11.2 were lecturers. The percentage of FTEF tenured tenure-track faculty combined was 63% of the total, still above that of the College of Science as a whole (59%), and well above the university average (53%). However, the department noted in its self-study that “the number of T/TT faculty in the department has been steadily declining since the late 1990s, irrespective of the high number of FTES we serve.”

The department has one administrative analyst specialist I; one administrative support coordinator II; three student assistants; and six instructional staff technicians to support twenty-five laboratory courses. The department noted a staffing shortage for instructional staff technicians in molecular biology and in plants and greenhouses. They also regretted the loss of a critical managerial position in the micro-service center.

The self-study also noted the “overextended and failing physical infrastructure of Duncan Hall.”

Recommendations from the Department

In its action plan, the department proposes the following:

- Develop an efficient strategy for alumni tracking.
- Re-establish PLO assessment program.
- Appoint a GE assessment coordinator to aggregate data from small GE courses.
- Develop, pilot, and implement an on-line version of current Biosafety course, BIOL 6.
- Reconstitute the graduate committee.
- Delete BIOL 4 and establish a major’s course that meets GE area E.
- Constitute a Facilities & Equipment Committee.
- Conduct ongoing evaluation and revamping of teaching programs.
- Zero enroll and phase out BA Life Science, Concentration in Wildlife Stewardship.
- Develop a workload matrix.
- Challenges and faculty workload

The department notes that its ability to accomplish the proposed action items and fulfill its mission is directly linked to addressing faculty workload.
Comments and Recommendations from External Evaluator

- The department possesses too many degree programs that are managed separately by faculty members with differing areas of expertise.

- Undergraduate degree programs too inflexible, lacking room for exploration or shifting educational goals; seats in required courses may not always be available.

- The large number of degree plan options and lack of clarity about required unit numbers make it difficult for students to navigate the curriculum; their number should be reduced.

- The department should revise the undergraduate and graduate curriculum to maximize ability of students to gain experience through independent research projects.

- Bureaucratic impediments to efficient advising should be minimized so that the faculty can get back to teaching courses, conducting research, and planning program improvements.

- Current RTP policy is excessively prescriptive and detailed while insufficiently attentive to the clarification of what counts overall as success.

- The department needs to recruit new tenure-track faculty members to address long-term deficit in full time faculty staffing.

- It is important to recruit existing tenured and tenure-track faculty to teach in the lower division rather than solely relying on new hires to do so.

- Research and teaching areas of new hires should balance current enrollment needs with a long-term vision for growth of the department.

- Workload formulas for teaching effort must reflect increased expectations for research and publication.

- The department should develop a model for faculty workload that reflects current knowledge about the value of student research, mentoring, and assessment into measurements of teaching effort.

- Laboratory spaces require renovation in order to meet needs for modern biological research and avoid health hazards.

- The department should develop a comprehensive plan for space utilization that takes into account serious problems with the laboratory/classroom building.

- The department should act as a responsible steward for the biodiversity collections that form an important historical legacy of SJSU's biological sciences program.