2018-19 Biology Annual Program Plan

I.A. Program Profile: Purpose

Describe the program(s) to be reviewed. What is the purpose of the program and how does it contribute to the mission of Skyline College?

Narrative

Biology continues to contribute to the College mission and goals by providing preparation for transfer to a baccalaureate institution, professional schools (for post baccalaureate) and for allied health workforce development. Nearly every student working towards an Associate degree and/or transfer takes a Biology course. The goals of BIOL courses include providing tools for students to make wise decisions regarding their personal health and the global environment. We are committed to the strategic priority of providing learning opportunities that prepare students for their future. Courses numbered BIOL 100—299 are transferable to UC and CSU. BIOL 100—199 are specifically designed to provide students with a scope of information that will help them develop the ability to objectively deal with the responsibilities of daily life with attention to environmental, social, and personal responsibilities. Courses numbered BIOL 200—299 are carefully designed and articulated for Biology, Biotechnology, and Allied Health Science degrees for transfer to four-year schools or professional programs. The core program for biology majors consists of two courses, BIOL 215 (Organismal Biology) and BIOL 230 (Introduction to Cell Biology). The primary goal of this program is to prepare students for upper division work at their transfer institutions. This is done through courses that offer a diversity of topics that emphasize critical thinking and laboratory skills.
BIOL 695 provides students with opportunities to explore scientific research. Students in BIOL 215 and BIOL 230 undertake original scientific research. Undergraduate research projects have been identified as a high-impact practice toward retention and completion.*

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*Kuh, G. (2008). High-impact Educational Practices. Washington, DC: Association of American Colleges and Universities.

Skyline COLLEGE

I.B. Program Planning Team

Annual program planning is intended to be a collaborative process which promotes dialogue and reflection. Please identify all individuals who contributed to or shaped the narrative. Include names and the title or role of each person.

Narrative

Christine Case

Shari Bookstaff

Yancy Aquino

Jing Folsom

Carina Anttila-Suarez

Nick Kapp

II.A. Analysis: Progress on Prior Program Objectives (Goals) and Activities

Describe the progress made on previously established program objectives (goals) including identification of achievements or areas in which further effort is needed. New programs which have not yet established CPR/APP objectives should discuss progress on program implementation or activities.

Narrative

Program objectives can be found in the Evidence Locker (BIOL Program Objectives). Faculty participated in development of meta-majors and developed two- and three-year course sequences for Biology and Allied Health guided pathways. We participate in development of the STEM center.

Every course has been assessed in some way by the end of the 2018-2019 cycle, most courses have been assessed several times. The data have been quite consistent across multiple assessments, demonstrating that the assessment methods themselves are good. Additional emphasis is made in class on areas where student performance falls below expectations.

Our classes are full and we frequently do not have enough equipment for each student to have a hands-on experience. We need to keep equipment current to meet the transfer and career objectives of majors and allied health students.

II.B. Analysis: Program Environment

Describe any recent external or internal changes impacting the program or which are expected to impact the program in the next year. Please include when the specified changes occurred or are expected to occur.

Narrative

Internal

The BIOL Load is one of the highest in the District (Figure 1). Our Load is 26.7% higher than CSM BIOL and 28.5% higher than Cañada BIOL. Our load increased 1.5% between Fall 2013 and Spring 2018, while the College Load decreased 5.4% (Figure 2). The quality of the program will be affected if our Action Plan is not implemented.

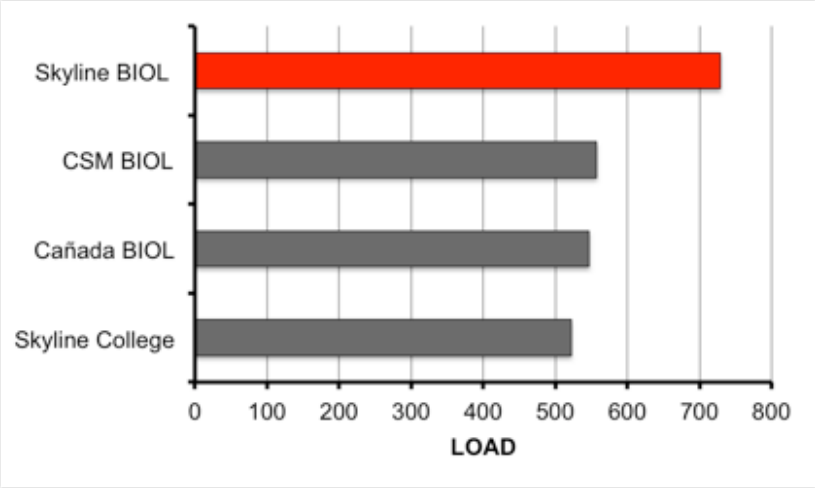

Figure 1. The Skyline BIOL load is 33.1% higher than the College and one of the highest LOADs in the District (Fall 2013 - Spring 2018).

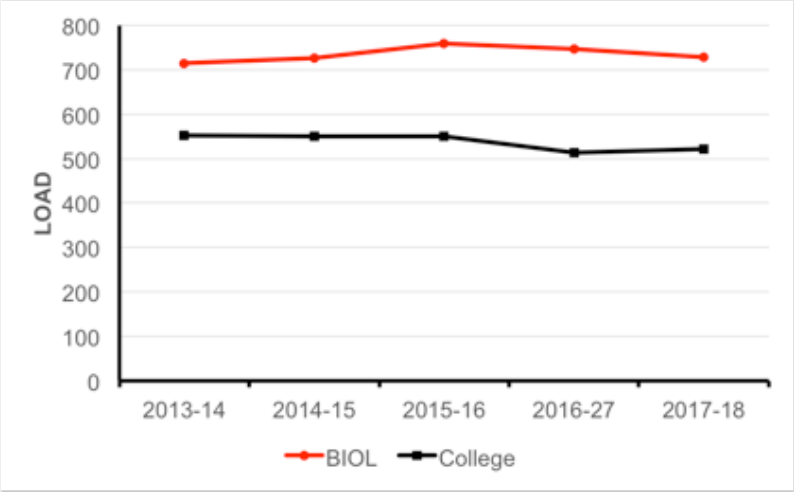

Figure 2. The Skyline BIOL load increased 1.5% while the College Load decreased 5.4% between Fall 2013 and Spring 2018.

We added BIOL 310 (Nutrition). This course was previously offered as a FCS, in the Business Division.

There are plans to move the BIOL 400 courses to BTEC. These courses were not regularly offered and their movement does not affect our Load.

Even with some courses (BIOL 140 and 150) online, Biology has run out of classroom space. The recent room scheduling changes (i.e., AdAstra) have been burdensome because we don't have our normal displays (e.g., periodic table, maps) and must reduce demonstrations because of logistics of transporting between buildings.

Humans thrive in a diverse and integrated world and our goal is to provide opportunities for people with a wide range of backgrounds to flourish. We plan to provide some sections of BIOL 130 in a hybrid and Distance Education (online) format. Some sections of BIOL 250 and BIOL 260 will be hybrid offerings with online lecture content and in-person laboratories.

External

Science education is critical for all students. Citizens are faced increasingly with having to grapple with matters of science in everyday life. Individuals are bombarded with blatant falsehoods about a variety of important topics including vaccines and nutrition, and some of the country's most complicated and urgent public policy debates have at their center been questions of science. For example, an understanding of the science of human health and climate change are critically important for informed personal health decisions and to inform policymakers who are advocating or opposing research; an understanding of ecological principals is essential to developing sustainability and energy policies.

A knowledge and respect of science is the ultimate equalizer: the pathway to human rights and a better quality of life. Countries that strongly supported science programs are better off economically and have greater numbers of people creating new technologies. We address these issues in our classes, and with special community events including Expanding Your Horizons and Earth Day.

II.C. Analysis: Student Learning Outcomes (SLOs and PSLOs)

(1) Instructional Programs Only: Describe what was learned from the assessment of course SLOs for the current and past year.
(2) Student Service Programs Only: If PSLOs are being assessed this year (3-year cycle), describe what was learned. If no assessment was done because this is an off-cycle year, please state that this item is not applicable.

Narrative

The Biology Department has three major areas of focus. General Education, Majors, and Allied Health Science. The Department has consistently developed General Education Biology courses (numbered BIOL 100–199) to provide students with a scope of information that will help them to objectively deal with the events and responsibilities of daily life. The primary goals of these courses are to promote scientific literacy and therefore good citizenship. SLOs for these courses are essentially identical and include specific information and problem-solving skills necessary to make decisions regarding personal nutrition, environmental resources, and personal health.

After BIOL 310 has been offered, we expect to renumber the new BIOL 310 (Nutrition) course in the 100s to indicate it fulfills the Life Science general education requirements.

We created SLOs for these courses based on the unifying themes in Biology including evolution, scientific methodology, and ecology that could be used to assess all of the 100-level courses. We created assessment criteria that set the bar high for ourselves to encourage us to promote scientific literacy for all. The 100-level courses have completed several SLO assessment cycles.

The majority of students in BIOL courses demonstrated effective communication (85%) and selecting appropriate information sources (82%). However, only 37% of students demonstrated proficiency in use of scientific literacy to address global issues. The SLOs for majors are based on skills and knowledge needed to continue in upper division work. At the end of Spring 2018, the average confidence for all tasks was 79%, ranging from 100% for micropipetting and spectrophotometry to 50% for gene expression and calculating Km. The majors do transfer to four-year schools and we do see the fruits of our labor. Several students have returned to Skyline College with advanced degrees to teach with us, present in our annual Expanding Your Horizons in Math and Science Conference and Science in Action lecture series, and contact us for recommendations for post-graduate programs and professional schools.
The SLOs for Allied Health courses were developed to cover skills and knowledge needed for the professional programs to which the students aspire. The students meet or exceed our standards.

III.A. Reflection: Considering Key Findings

Consider the previous analysis of progress achieved, program environment, and course-level SLOs or PSLOs (if applicable). What are the key findings and/or conclusions drawn? Discuss how what was learned can be used to improve the program's effectiveness.

Narrative

Several common issues recur in examining reasons why General Education students are not meeting the various standards. These include:

- Students are underprepared coming into the introductory level courses. However, more importantly they come in saying "I don't like science" or "I don't do well in science."
- Students do not integrate information from several sources when they are writing essays, research papers, and other assignments that require this skill. It is apparent that students write the first response to googling the question—regardless of whether the response addresses the question.
- Students have difficulty solving problems that require a multi-step process and/or quantitative skills.

While continuing to incorporate the importance and fun of understanding sciences some mitigations in progress:

- Divide challenging (quantitative) concepts into step-wise problems that guide problem solving.
- Incorporate more assessment measures that allow students to work collaboratively. (This has resulted in increased scores.)
- Require students to analyze why each possible answer to a multiple-choice question is or is not correct.

We have had good student response to department activities that involve students in community activities where students

- Present workshops at Expanding Your Horizons.
- Participate in community STEM fairs.
- Participate in the Science in Action lecture series. Participate in professional conference such as the Chinese Bioscience Association Annual Conference and Parenteral Drug Association events.
- Do scientific research and present their at the Skyline Research symposium, Bay Area Honors, and at national meetings such as ABRCMS and SACNAS. In fact, several students have received awards for their presentations at these meetings.
- Honor students' research on microbiomes was published in published in Civic Scholar (Phi Theta Kappa, 2018).

Overall, our students are successful; some of our former students are now on the faculty.

III.B. Reflection: ISLOs

If your program participated in assessment of ISLOs this year:
(1) What are the findings and/or conclusions drawn?
(2) Does the program intend to make any changes or investigate further based on the findings? If so, briefly describe what the program intends to do.

Narrative

Institutional SLOs (ISLOs) are regularly assessed in Biology. ISLOs such as citizenship, information literacy, and critical thinking are highly integrated into our courses. Faculty participated in the Effective Communication ISLO in the Fall 2018 and Critical Thinking ISLO in the Spring 2019. We continue to use our ISLO assessment assignments to develop projects for our students, which stimulate them to excel in ISLOs and encourage them to continue to promote science in decision-making. By continuing work on ISLOs, we will ensure our students understand that many important personal and societal decisions they will make must be based in science.

In general, students did not meet targets for analyzing data or other evidence. They met or surpassed our expectations for finding information but often failed to use the information to specifically address a problem.

We look forward to the planned STEM Center. The STEM Center will provide opportunities for students to be engaged in the learning process. The interaction and camaraderie will help development of analytical reasoning skills. We see successful collaborations during laboratory sessions. The STEM center will take that experience to another level. Working with students in a variety of STEM courses will excite and energize students, and expose them to a wide variety of skills, concepts, and careers.

IV.A. Strategy for Program Enhancement: Continuation/Modification

Indicate whether the program is continuing implementation of the last CPR strategy or revising the strategy. Please describe the modifications if revisions are intended.

Note: Any new strategies should be linked to Institutional Goals through creation of objectives in the next section. If the program has not yet participated in comprehensive program review, an annual or multi-year strategy can be defined in this item.

Narrative

We continue our dedication to science education and to Skyline College students. We requested a full-time anatomy (BIOL 250) faculty position in our CPR 2014 and APPs 2013 and 2015. All eight sections of BIOL 250 are still taught by adjunct faculty. Thus students do not have access to support for the required laboratory study hours. Additionally, another faculty member has taken on the additional responsibilities of maintaining laboratory specimens and curriculum development.

Degrees

Our Allied Health students usually earn the associate degree in Allied Health. From student surveys, we know that 100% of our majors transfer or go directly to professional schools although they are not earning (the Natural Science) Associate degrees.

Degree	Percent of degrees offered 2013-2018*
Allied Health	9.4
Natural Science	2.3

Our AS-T curriculum was approved by the State in 2017. Five AS-T Biology degrees were awarded in 2018. For years, the Natural Science degree has included Biology, Geology, Chemistry, and Physics majors. This is the first year that the AS-T Biology is in the College Catalog. The Natural Science degree will be preferred by students planning to transfer to the University of California.

Of the Top 10 degrees*, Allied health is #2, after IS-Letters & Science, and Natural Science is number 10.

General Education

Students in G.E. Biology generally enjoy Biology and are more comfortable with science after taking their Biology class. They are less fearful of scientific/technical issues on a ballot. Students completing G.E. Biology understand the evolution of life on Earth and learn their role as responsible citizens of the planet. Allied Health students gain the knowledge and skills necessary for their professional paths.

Asking questions is an essential part of doing science and a fundamental skill expected of scientists. Questioning facilitates development of analytical and critical thinking skills. To further engage students, we have implemented the use of online Course Management Systems to supplement instruction. Students who may not participate in the classroom do participate online. We encourage students to think critically and avoid writing the first response to googling a question by proposing problems that require several sources and/or collaboration with classmates.

Most of our classes have a laboratory component. Performing lab experiments gives student experience in learning how science works and in critical thinking. Lab experiments require that students ask questions, and critically analyze their data. It isn't possible to google the analysis of unique laboratory data.

Demographics, success, and retention

From available data (2013-2018): Higher percentages of female and Filipino students are in BIOL than in other College classes. The percentage of White students in Biology courses is significantly less than the College enrollment. Overall, success in Biology (72.8%) is similar to the College (72.3%). Retention in Biology (86.5%) is the same as the College (86%). The course withdrawal rate (13.5%) is 3.6% lower than the College (14.0%).

Data needs

To determine how to best serve our students, we have been requesting data annually since 2012 that we have not received. We would like these data in Excel.

1. A common concern of students is whether they will be able to handle multiple Allied Health Science laboratory courses. We are requesting a comparison of success rates of full time students who have completed similar levels of prerequisite course work (for example, CHEM 410 and a previous BIOL course with lab) when they take BIOL 240 and/or BIOL 250 and/or BIOL 260 alone vs. when two of these demanding lab courses are taken concurrently. We would like the data to cover 5 years.
2. The number of Life Science (e.g., BIOL, premed, and related areas) planning to transfer and who do transfer.

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* 2013-14 through 2017-18.
skylinecollege.edu/prie/assets/research/DegreesCertificatesAwarded.pdf.

IV.B. Strategy for Program Enhancement: Action Plan and Resource Requests

Based on the most recent CPR and any desired modifications, develop an annual action plan with related resource requests. No narrative response will be entered in this section, but the objectives you create will be printed automatically in the APP report under this item.

(1) To begin, click on PLANNING at the top of the page, then CREATE A NEW OBJECTIVE. To view previously created objectives, click PLANNING at the top of the page, then VIEW MY OBJECTIVE.
(2) IMPORTANT! Make sure to associate each objective to this standard in the APP. Need help? Contact the PRIE Office for further instructions. Institutional Goals. Need help? Contact the PRIE Office for further instructions.

Narrative

Associated Objectives

809-Allied health: Provide students with opportunities to master understanding of the structure and organ-systems functions of the human body, asepsis, cellular metabolism, and epidemiology.

810-Enhancing mastery of Biology, developing scientific reasoning abilities, increasing understanding of the complexity and ambiguity of empirical work, developing practical skills, increasing understanding of the nature of science, cultivating interest

811-Majors: Provide students with opportunities to design, perform and analyze experiments in biology These lab projects have been identified as a high-impact practice toward retention and completion.

808-Planning & Curriculum: Provide curriculum, including laboratory, development that is consistent across sections and consistent with department objectives. Ensure that laboratory equipment is proper working order.

Enhanced Budget with Objectives and Tasks

Budget with Objectives of Biology unit