

## 2018 Biological Sciences Annual Program Plan

### BIOL Biological Sciences

#### 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 postbaccalaureate) 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. An honors course (BIOL 675) is offered for concurrent enrollment with another BIOL course. BIOL 695 provides students with opportunities to explore scientific research.

**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 Bookstaf

Carina Anttila-Suarez

Nick Kapp

Yancy Aquino

**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**

Every course has been assessed in some way by the end of the 2017-2018 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. Faculty participated in the citizenship ISLO for the Spring 2017 semester.

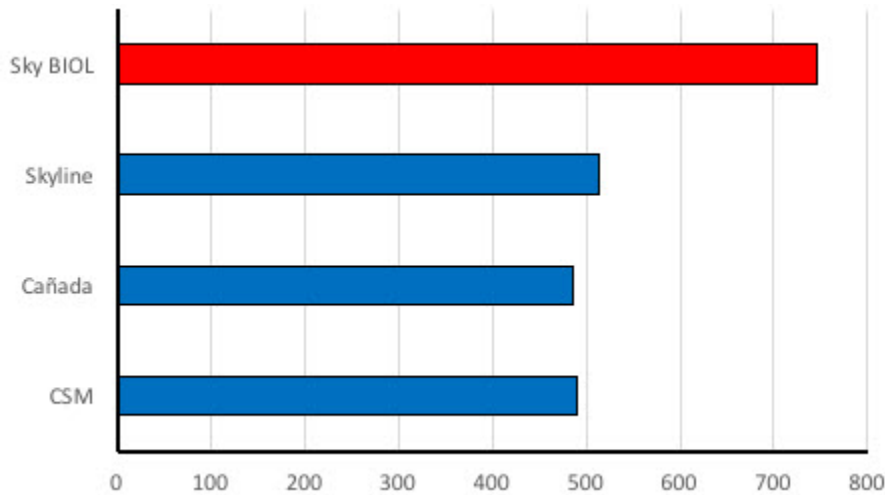
## II.B. Analysis: Program Environment

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.

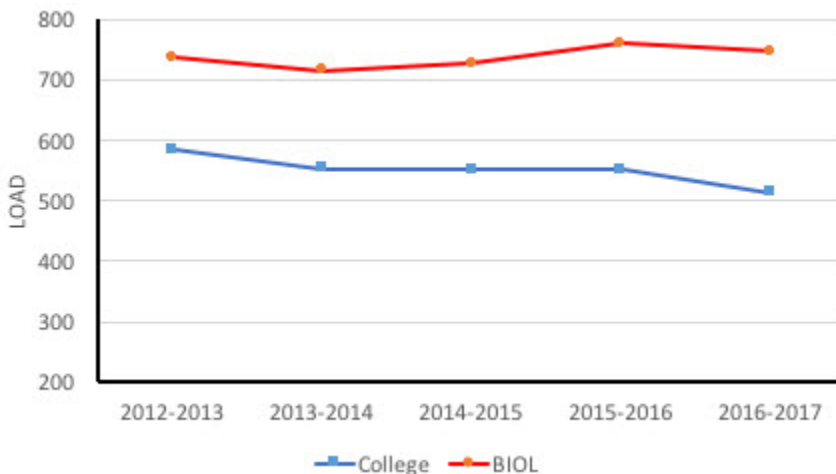
### Narrative

#### Internal

The BIOL Load is one of the highest in the District (**Figure 1**). Our Load is 28% higher than CSM BIOL and 33% higher than Cañada BIOL. Our load increased 1.2% between Fall 2012 and Spring 2017, while the College Load decreased 12.2% (**Figure 2**). The quality of the program will be affected if our Action Plan is not implemented.



**Figure 1.** The Skyline BIOL load is one of the highest LOADs in the District (Fall 2012 - Spring 2017).



**Figure 2.** The Skyline BIOL load increased 1.2% while the College Load decreased 12.2% between Fall 2012 and Spring 2017.

No new courses have been added to Biology in the past year. The Biotech courses (170/171, and 400s have been moved to the new BTEC department. 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, which is compounded by the planned closing of the Pacific Heights building in Fall 2018. 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 principal 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.

## **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.

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 SLOs for majors are based on skills and knowledge needed to continue in upper division work. Our BIOL majors are confident in their abilities: They scored 4.4 (out of 5) on a self-assessment at the end of the Spring 2016 semester. 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 and Earth week activities.
- Participate in the Science in Action lecture series.
- Do scientific research including the Pier Review project and present their at the Skyline Research symposium.

Overall, we are 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. 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 2012-2017*
Allied Health	9.6
Natural Science	2.6

We have developed an AS-T curriculum, which was approved by the State. 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. Natural Science is not listed in the Top 10 but our calculations show Natural Science is #11 (2.6%) of degrees awarded). We expect to see an increase in Biology degrees when the AS-T Biology degree is implemented.

##### 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. Allied Health students gain the knowledge and skills necessary for their professional paths. In the current economy, many

students have returned from the CSU and UC systems to increase their skill set to improve their chances of being hired in biotechnology. The Biotechnology program is being redesigned and expanded to help these students meet their needs.

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 (2012-2017): Higher percentages of female and Filipino students are in BIOL than in other College classes. The percentage of White students in Biology courses is less than the College enrollment. Overall, success in Biology (72%) is similar to the College (71%). Retention in Biology (86%) is the same as the College (86%).

### **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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\* [skylinecollege.edu/prie/assets/research/DegreesCertificates-gender.pdf](http://skylinecollege.edu/prie/assets/research/DegreesCertificates-gender.pdf).

† [skylinecollege.edu/prie/assets/research/DegreeCertificateAwarded.pdf](http://skylinecollege.edu/prie/assets/research/DegreeCertificateAwarded.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.

#### **Narrative**

 [Budget and Objectives of Biological Sciences Department](#)

# Objectives of Biological Sciences Department

Planning Year: 2018-2019

Planning Year: 2018-2019

Unit Code	Planning Unit	Unit Manager
2414BIOL00	Biological Sciences	Case, Christine

## Objective Status: New/In Progress

432	Allied Health Science: Planning & Curriculum  Need 2 full-time instructors. Our LOAD is among the highest in the District and has increased since 2012-13. Faculty are needed to maintain curriculum and laboratories. All eight section of Human Anatomy and four sections of Human Physiology are taught by adjunct faculty. At present one full-time temporary BIOL faculty, with a full teaching load, must maintain equipment and supplies in the Anatomy lab, manage SLO assessment, and laboratory schedules. 2 x \$90,000.
433	To provide opportunities for students to master material.  Instructional Aide position. Increase current part-time position to full-time. Extraordinary pressure is put on the stockroom technician to monitor equipment and supplies, as well as supervise open-lab sessions. The Technician has the only office in the laboratory-annex part of the Science building. The Biology stockroom technician is not classified as an Instructional Aide, yet she regularly manages open labs, interacts with and assists students, in addition to her technician duties. An Instructional Aide is consistent with a STEM center because science requires mastery of laboratory skills. A full-time Instructional Aide is needed on the second floor for BIOL 215, 230, 240, and 250. \$60,000
434	Scientific Method  Glass filter holder assembly with funnel, fitted base, stopper, clamp, 47mm. After 30 years of using membrane filtration, we have only two filter assemblies left for classes of 30 students. \$250
435	Scientific Method  Analytical balance. Students are required to weigh materials almost weekly in all labs. \$1700.
437	Computer literacy, critical thinking  PC/Mac laptops and cart. Computer literacy is important to all allied health professionals, as computers are at the core of the medical health system. Physiology student run computer simulations, generate experimental data, analyze graphs and make presentations. For the past 17 years, a computer center with rooms that had 30+ PC work stations were available. Unfortunately, this program is being phased out, and the single remaining room will be phased out soon. We need to obtain a PC cart with 20 PC laptops, 20 external CD drives, and a printer for 7210 (Anatomy/Physiology).  We need to upgrade the Macs in 7241 and 7238.  \$30,000.
439	Allied Health Science: Anatomy  Synthetic cadaver. One real cadaver (above) could be replaced with a synthetic cadaver: \$70,000. A synthetic cadaver needs annual maintenance: \$7500/year

440	Majors: Laboratory Techniques Keyence software. Students and faculty need to record, count, and measure specimens (e.g., cells) with the Keyence microscope. \$15,000
441	Majors: Laboratory Techniques Stage micrometers. Students and faculty need to calibrate microscopes to measure specimens. 5 @ \$80 = \$400.
442	Laboratory Techniques Shaker water baths (with removable, different size flask holders). All students and lab technician need to grow cells and prepare materials. \$800
443	Laboratory Techniques Students general education, allied health, majors need consumable supplies in lab. Every year we are short by \$10,000.  An additional \$10,000/year.
444	Laboratory Techniques Stereoscopic microscopes. All students need to be able to use microscopes to make observations during lab. 10@\$1300 = \$13,000
445	Laboratory Techniques Handheld UV lamps. Several (majors and nonmajors) experiments require UV illumination. 3@ \$350 = \$1050.
449	Allied Health: Laboratory Techniques Microscope eyepiece pointers. Microscopes in BIOL 250 and BIOL 260 do not have pointers, which are essential for accurate results. 30@\$40 = \$1200
450	Allied Health: Laboratory Techniques External DVD players. For BIOL 260 students to graph and analyze their data. 30@\$80 = \$2400
451	Majors: Laboratory Techniques Refrigerator with glass door. Need to store growth media and perishables for majors classes. \$2500.
452	Laboratory Techniques Water bath. Need to replace waterbath, current waterbath has no temperature readout. one per table = 7@\$400 = \$2800

453	Allied Health: Laboratory Techniques Big incubator. The current incubator has broken down several times. Incubators are critical for (four sections of) BIOL 240. \$15,000
454	Laboratory Techniques Deep freezer. Many reagents and bacterial cultures need to be stored at -70°C. The current freezer is old and breaking down. \$10,000
455	Laboratory Techniques Scales. We do not have enough scales for technicians' and students' use. 2 @ \$1000 = \$2000
456	Laboratory Techniques Maintenance budget for equipment. Equipment needs to be in working order for technicians to prepare materials and for students to do their experiments. Equipment is deteriorating...fan in an incubator doesn't get it. \$20,000
457	Laboratory Techniques Preventive maintenance for autoclave. Maintenance should be an on-going cost, to prolong the life of the autoclave. \$10,000
458	Majors: Laboratory Techniques Camera for microscope. We have one camera to be shared by 30 students in a laboratory. We need a second camera. \$1200
459	Allied Health: Mastering knowledge Torso model. BIOL 250 students need to see subcutaneous anatomy. \$5500.
460	Ecological studies Camera traps. Student field studies to see nocturnal animal activity and see animals that are scared away by large classes. 8 & \$200.
461	Laboratory Safety Ventilation. Hood over autoclave in 7239 is in adequate and needs to be enlarged to accommodate autoclave.

462	Cadaver & prosection
	<p>Cadaver &amp; prosection. We currently have two cadavers (1 year and 4 years old), One has been here about six years and is completely dissected. The other is about four years old and is mostly dissected. Anatomy students learn best by viewing and working with the actual human body. Cadaver dissection is part of the anatomy curriculum. The cadaver also serves as part of the lab practical. This needs to be a recurring budget item so we can replace one cadaver every three years. \$6,000</p>
463	Majors: Laboratory Techniques
	<p>High-speed refrigerated centrifuge for 15- and 50-ml tubes. The centrifuge is broken and is required to isolate cell parts.</p>
470	Majors: Laboratory Techniques
	<p>Orbital shakers for growing cell cultures. The donated orbital shaker is on it's last legs and needs to be shared between two labs.</p>
	<p>2@\$600=\$1200</p>
471	Laboratory Techniques
	<p>Equipment maintenance: Preventive and repair maintenance is essential because equipment is used by 30-60 students on a weekly basis.</p>
581	Allied Health: Laboratory techniques
	<p>EKG machines. To update so students see current technology.</p>