

# Program Review - Academic - Biology Latest Version

## Overview

Program Review - Collaborators : Version by **Foley, Denise** on **12/11/2019 21:20**

| Collaborators                                                                                           |
|---------------------------------------------------------------------------------------------------------|
| Anson Lui, Navanot Batth, Sandra Sanchez, Kimberly Johnson, Michael Taylor, Denise Foley and Mark Smith |

Program Review Overview - Organizational Chart : Version by **Foley, Denise** on **11/03/2019 23:04**

Please insert the organizational chart for this program or service area.

## Biology Department Organization by Program

### Biotechnology

Anson Lui  
Navanot Batth  
Denise Foley  
**Adjuncts**

Mark Smith, co-chair  
Denise Foley, co-chair  
Kristi Hale, Science Coordinator  
Majors and Non-majors bio, and Anatomy and Physiology  
Susana Espino, Science Coordinator  
Microbiology and Biotechnology

### Health Science

Kimberly Johnson  
Sandra Sanchez  
Mark Smith  
Denise Foley  
**Adjuncts**

### Majors and Non-majors

Michael Taylor  
Mark Smith  
Anson Lui  
Navanot Batth  
**Adjuncts**

### Biology Adjuncts:

Maribel Arias  
Bob Allen  
Jacob Drainville  
Jessica Hughes  
Jennifer Mastroianni  
Anne Matthews  
Kriska Parda  
Kelly Ramin  
Erica Sharar

Program Review Overview - Award Programs : Version by **Foley, Denise** on **12/11/2019 21:20**

We have both an A.S and an AS-T in biology. The biotechnology program has an A.S degree that can transfer into the Biomanufacturing B.S. degrees at Solano and Mira Costa community colleges. In addition, we have 4 certificates in biotechnology which relate and stack as students take courses. The Food safety certificate and the certificate of proficiency are currently undergoing significant revisions in the curriculum approval process. The certificate of proficiency is undergoing revision and approval as a certificate of achievement. The Food safety certificate is undergoing revision such that it will be an entry level certificate instead of a culminating certificate.

| Award Programs                                       |
|------------------------------------------------------|
| Biology, AS                                          |
| Biology, AS-T                                        |
| Biotechnology Biomanufacturing Technician, CA        |
| Biotechnology Lab Assistant, CERT                    |
| Biotechnology Laboratory Technician: Food Safety, CA |
| Biotechnology, AS                                    |
| General Biotechnology Technician, CA                 |

## Program Review Overview - Course Offerings: Unique Courses : Version by Foley, Denise on 11/03/2019 23:04

Data includes summer and intersession. With the introduction of the biotechnology program in 2013, we have increased the variety of courses offered during the academic year.

| Unique Courses in 2014-2015 | Unique Courses in 2015-2016 | Unique Courses in 2016-2017 | Unique Courses in 2017-2018 |
|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
| 80                          | 85                          | 92                          | 90                          |

## Program Review Overview - Course Offerings - Number of Sections Offered : Version by Foley, Denise on 11/03/2019 23:04

| Number of Sections Offered | 2014-2015 | 2015-2016 | 2016-2017 | 2017-2018 |
|----------------------------|-----------|-----------|-----------|-----------|
| face to face               | 76        | 79        | 84        | 85        |
| online                     | 1         | 2         | 3         | 2         |
| hybrid                     | 3         | 4         | 5         | 3         |

## Program Review Overview - Course Offerings - Total Enrollment : Version by Foley, Denise on 11/03/2019 23:04

| Total Enrollment (Seats Filled) | 2014-2015 | 2015-2016 | 2016-2017 | 2017-2018 |
|---------------------------------|-----------|-----------|-----------|-----------|
|                                 | 3371      | 3298      | 3357      | 3264      |
| *3317 in 2018-19                |           |           |           |           |

## Program Review Overview - Course Offerings - Students per Offered Section : Version by Foley, Denise on 12/11/2019 21:20

| Students per Section | 2014-2015 | 2015-2016 | 2016-2017 | 2017-2018 |
|----------------------|-----------|-----------|-----------|-----------|
| face to face         | 43        | 40        | 37        | 37        |
| online               | 17        | 21        | 22        | 32        |
| hybrid               | 19        | 27        | 34        | 37        |

## Program Review Overview - Faculty Workload LHE : Version by Foley, Denise on 12/11/2019 21:20

| 2017-2018    |              |                |               |              |              | 2018-2019    |              |                |               |              |              |
|--------------|--------------|----------------|---------------|--------------|--------------|--------------|--------------|----------------|---------------|--------------|--------------|
| Contract     | LHE          | % LHE          | Faculty Count | LHE/Faculty  | FTEF         | Contract     | LHE          | % LHE          | Faculty Count | LHE/Faculty  | FTEF         |
| Full-Time    | 180.0        | 41.90%         | 6             | 30.00        | 6.00         | Full-Time    | 210.0        | 48.31%         | 7             | 30.00        | 7.00         |
| Overload     | 70.2         | 16.34%         | 6             | 11.70        | 2.34         | Overload     | 89.0         | 20.47%         | 7             | 12.71        | 2.97         |
| Part-Time    | 179.4        | 41.76%         | 16            | 11.21        | 5.98         | Part-Time    | 135.8        | 31.23%         | 11            | 12.34        | 4.53         |
| <b>Total</b> | <b>429.6</b> | <b>100.00%</b> | <b>21</b>     | <b>20.46</b> | <b>14.32</b> | <b>Total</b> | <b>434.7</b> | <b>100.00%</b> | <b>18</b>     | <b>24.15</b> | <b>14.49</b> |

| 2014-2015    |              |                |               |              |              | 2015-2016    |              |                |               |              |              | 2016-2017    |              |                |               |              |              |
|--------------|--------------|----------------|---------------|--------------|--------------|--------------|--------------|----------------|---------------|--------------|--------------|--------------|--------------|----------------|---------------|--------------|--------------|
| Contract     | LHE          | % LHE          | Faculty Count | LHE/Faculty  | FTEF         | Contract     | LHE          | % LHE          | Faculty Count | LHE/Faculty  | FTEF         | Contract     | LHE          | % LHE          | Faculty Count | LHE/Faculty  | FTEF         |
| Full-Time    | 177.0        | 46.88%         | 6             | 29.50        | 5.90         | Full-Time    | 207.9        | 52.25%         | 7             | 29.70        | 6.93         | Full-Time    | 120.0        | 29.62%         | 4             | 30.00        | 4.00         |
| Overload     | 87.8         | 23.24%         | 5             | 17.55        | 2.93         | Overload     | 68.7         | 17.26%         | 7             | 9.81         | 2.29         | Overload     | 91.6         | 22.61%         | 6             | 15.27        | 3.05         |
| Part-Time    | 112.8        | 29.88%         | 12            | 9.40         | 3.76         | Part-Time    | 121.3        | 30.49%         | 14            | 8.67         | 4.04         | Part-Time    | 193.6        | 47.77%         | 17            | 11.39        | 6.45         |
| <b>Total</b> | <b>377.6</b> | <b>100.00%</b> | <b>18</b>     | <b>20.98</b> | <b>12.59</b> | <b>Total</b> | <b>397.9</b> | <b>100.00%</b> | <b>21</b>     | <b>18.95</b> | <b>13.26</b> | <b>Total</b> | <b>405.2</b> | <b>100.00%</b> | <b>23</b>     | <b>17.62</b> | <b>13.51</b> |

These numbers reflect the unanticipated retirement of Charleen Powers and Robert Houska in 2017-2017 which corresponded to the sabbatical leave of Denise Foley the same year. Kimberly Johnson, Sandra Sanchez and Navanot (Novy) Batth have been hired since that time in that order.

| Full-time LHE # | Full-time LHE % | Part-time LHE # | Part-time LHE | Overload LHE # | Overload LHE % | Total LHE # | Total LHE % |
|-----------------|-----------------|-----------------|---------------|----------------|----------------|-------------|-------------|
| (2014-15 ) 177  | 47%             | 113             | 30%           | 88             | 23%            | 378         | 100%        |
| (2015-16) 208   | 52%             | 121             | 31%           | 69             | 17%            | 398         | 100%        |
| (2016-17) 120   | 30%             | 194             | 48%           | 92             | 23%            | 405         | 100%        |
| (2017-18 )180   | 42%             | 179             | 42%           | 70             | 16%            | 430         | 100%        |
| (2018-19) 210   | 48%             | 136             | 31%           | 89             | 20%            | 435         | 100%        |

## Program Review Overview - Faculty Workload Faculty Headcount : Version by Foley, Denise on 12/11/2019 21:20

| 2017-2018    |              |                |               |              |              | 2018-2019    |              |                |               |              |              |
|--------------|--------------|----------------|---------------|--------------|--------------|--------------|--------------|----------------|---------------|--------------|--------------|
| Contract     | LHE          | % LHE          | Faculty Count | LHE/Faculty  | FTEF         | Contract     | LHE          | % LHE          | Faculty Count | LHE/Faculty  | FTEF         |
| Full-Time    | 180.0        | 45.71%         | 6             | 30.00        | 6.00         | Full-Time    | 210.0        | 54.41%         | 7             | 30.00        | 7.00         |
| Overload     | 48.8         | 12.38%         | 6             | 8.13         | 1.63         | Overload     | 49.2         | 12.75%         | 6             | 8.21         | 1.64         |
| Part-Time    | 165.0        | 41.90%         | 15            | 11.00        | 5.50         | Part-Time    | 126.8        | 32.84%         | 10            | 12.68        | 4.23         |
| <b>Total</b> | <b>393.8</b> | <b>100.00%</b> | <b>21</b>     | <b>18.75</b> | <b>13.13</b> | <b>Total</b> | <b>386.0</b> | <b>100.00%</b> | <b>17</b>     | <b>22.70</b> | <b>12.87</b> |

| 2014-2015    |              |                |               |              |              | 2015-2016    |              |                |               |              |              | 2016-2017    |              |                |               |              |              |
|--------------|--------------|----------------|---------------|--------------|--------------|--------------|--------------|----------------|---------------|--------------|--------------|--------------|--------------|----------------|---------------|--------------|--------------|
| Contract     | LHE          | % LHE          | Faculty Count | LHE/Faculty  | FTEF         | Contract     | LHE          | % LHE          | Faculty Count | LHE/Faculty  | FTEF         | Contract     | LHE          | % LHE          | Faculty Count | LHE/Faculty  | FTEF         |
| Full-Time    | 177.0        | 53.96%         | 6             | 29.50        | 5.90         | Full-Time    | 207.9        | 59.67%         | 7             | 29.70        | 6.93         | Full-Time    | 120.0        | 33.65%         | 4             | 30.00        | 4.00         |
| Overload     | 55.2         | 16.83%         | 5             | 11.04        | 1.84         | Overload     | 43.2         | 12.39%         | 7             | 6.17         | 1.44         | Overload     | 59.5         | 16.68%         | 5             | 11.90        | 1.98         |
| Part-Time    | 95.9         | 29.22%         | 11            | 8.71         | 3.20         | Part-Time    | 97.3         | 27.94%         | 12            | 8.11         | 3.24         | Part-Time    | 177.2        | 49.67%         | 17            | 10.42        | 5.91         |
| <b>Total</b> | <b>328.1</b> | <b>100.00%</b> | <b>17</b>     | <b>19.30</b> | <b>10.94</b> | <b>Total</b> | <b>348.4</b> | <b>100.00%</b> | <b>19</b>     | <b>18.34</b> | <b>11.61</b> | <b>Total</b> | <b>356.7</b> | <b>100.00%</b> | <b>22</b>     | <b>16.21</b> | <b>11.89</b> |

These numbers reflect the unanticipated retirement of Charleen Powers and Robert Houska in 2017-2017 which corresponded to the sabbatical leave of Denise Foley the same year. Kimberly Johnson, Sandra Sanchez and Navanjot (Novy) Batth have been hired since that time in that order.

| Full-time Faculty Headcount | Part-time Faculty Headcount | Overload Faculty Headcount | Total Faculty Headcount |
|-----------------------------|-----------------------------|----------------------------|-------------------------|
| (2014-15) 6                 | 11                          | 5                          | 17                      |
| (2015-16) 7                 | 12                          | 7                          | 19                      |
| (2016-17) 4                 | 17                          | 5                          | 22                      |
| (2017-18) 6                 | 15                          | 6                          | 21                      |

## Program Review Overview - Faculty Workload LHE per Faculty : Version by Foley, Denise on 12/11/2019 21:20

| 2017-2018    |              |                |               |              |              | 2018-2019    |              |                |               |              |              |
|--------------|--------------|----------------|---------------|--------------|--------------|--------------|--------------|----------------|---------------|--------------|--------------|
| Contract     | LHE          | % LHE          | Faculty Count | LHE/Faculty  | FTEF         | Contract     | LHE          | % LHE          | Faculty Count | LHE/Faculty  | FTEF         |
| Full-Time    | 180.0        | 45.71%         | 6             | 30.00        | 6.00         | Full-Time    | 210.0        | 54.41%         | 7             | 30.00        | 7.00         |
| Overload     | 48.8         | 12.38%         | 6             | 8.13         | 1.63         | Overload     | 49.2         | 12.75%         | 6             | 8.21         | 1.64         |
| Part-Time    | 165.0        | 41.90%         | 15            | 11.00        | 5.50         | Part-Time    | 126.8        | 32.84%         | 10            | 12.68        | 4.23         |
| <b>Total</b> | <b>393.8</b> | <b>100.00%</b> | <b>21</b>     | <b>18.75</b> | <b>13.13</b> | <b>Total</b> | <b>386.0</b> | <b>100.00%</b> | <b>17</b>     | <b>22.70</b> | <b>12.87</b> |

| 2014-2015    |              |                |               |              |              | 2015-2016    |              |                |               |              |              | 2016-2017    |              |                |               |              |              |
|--------------|--------------|----------------|---------------|--------------|--------------|--------------|--------------|----------------|---------------|--------------|--------------|--------------|--------------|----------------|---------------|--------------|--------------|
| Contract     | LHE          | % LHE          | Faculty Count | LHE/Faculty  | FTEF         | Contract     | LHE          | % LHE          | Faculty Count | LHE/Faculty  | FTEF         | Contract     | LHE          | % LHE          | Faculty Count | LHE/Faculty  | FTEF         |
| Full-Time    | 177.0        | 53.96%         | 6             | 29.50        | 5.90         | Full-Time    | 207.9        | 59.67%         | 7             | 29.70        | 6.93         | Full-Time    | 120.0        | 33.65%         | 4             | 30.00        | 4.00         |
| Overload     | 55.2         | 16.83%         | 5             | 11.04        | 1.84         | Overload     | 43.2         | 12.39%         | 7             | 6.17         | 1.44         | Overload     | 59.5         | 16.68%         | 5             | 11.90        | 1.98         |
| Part-Time    | 95.9         | 29.22%         | 11            | 8.71         | 3.20         | Part-Time    | 97.3         | 27.94%         | 12            | 8.11         | 3.24         | Part-Time    | 177.2        | 49.67%         | 17            | 10.42        | 5.91         |
| <b>Total</b> | <b>328.1</b> | <b>100.00%</b> | <b>17</b>     | <b>19.30</b> | <b>10.94</b> | <b>Total</b> | <b>348.4</b> | <b>100.00%</b> | <b>19</b>     | <b>18.34</b> | <b>11.61</b> | <b>Total</b> | <b>356.7</b> | <b>100.00%</b> | <b>22</b>     | <b>16.21</b> | <b>11.89</b> |

These numbers reflect the unanticipated retirement of Charleen Powers and Robert Houska in 2017-2017 which corresponded to the sabbatical leave of Denise Foley the same year. Kimberly Johnson, Sandra Sanchez and Navanjot (Novy) Batth have been hired since that time in that order.

| Full-time LHE per Faculty | Part-time LHE per Faculty | Overload LHE per Faculty | Total LHE per Faculty |
|---------------------------|---------------------------|--------------------------|-----------------------|
| (2014-15) 29.5            | 8.71                      | 11.04                    | 19.3                  |
| (2015-16) 29.7            | 8.11                      | 6.17                     | 18.34                 |
| (2016-2017) 30            | 10.42                     | 11.9                     | 16.21                 |
| (2017-18) 30              | 11                        | 8.13                     | 18.75                 |
| (2018-19) 30              | 12.68                     | 8.21                     | 12.68                 |

## Program Review Overview - Faculty Workload FTEF (LHE/30) : Version by Foley, Denise on 12/11/2019 21:20

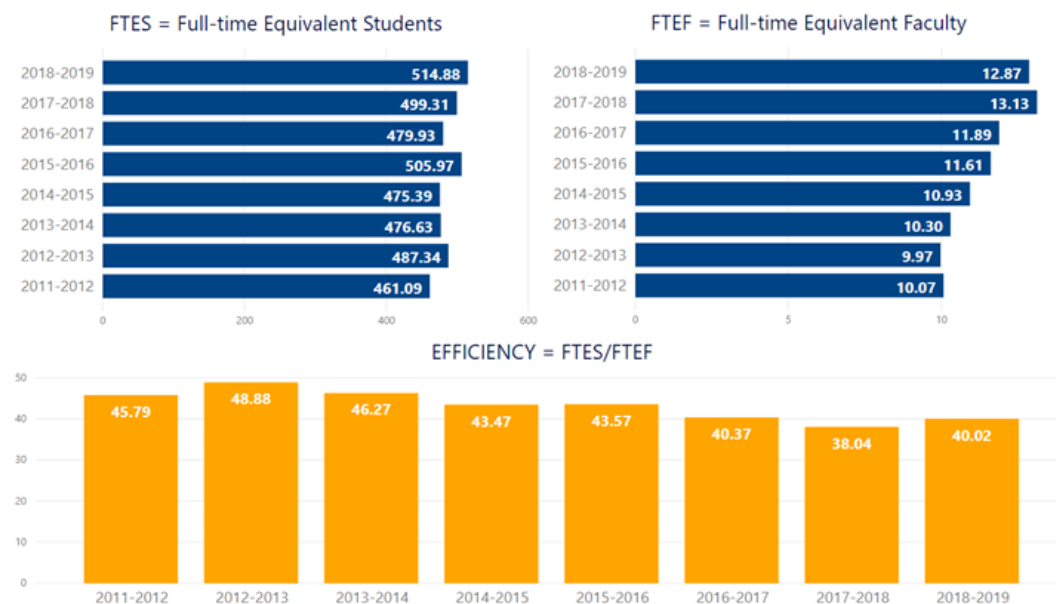
These numbers reflect the unanticipated retirement of Charleen Powers and Robert Houska in 2017-2017 which corresponded to the sabbatical leave of Denise Foley the same year. Kimberly Johnson, Sandra Sanchez and Navanjot (Novy) Batth have been hired since that time in that order. We currently have seven full time faculty in the Biology department which teach in three areas (Health Science, Majors Biology, Biotechnology). In the most recent years with 6 or 7 full time faculty, it appears that we have enough courses to support up to 12 or 13 full time faculty.

| Full-time FTEF  | Part-time FTEF | Overload FTEF | Total FTEF |
|-----------------|----------------|---------------|------------|
| (2014-15) 5.9   | 3.2            | 1.84          | 10.94      |
| (2015-16) 6.93  | 3.24           | 1.44          | 11.61      |
| (2016-17) 4.0   | 5.91           | 1.96          | 11.89      |
| (2017-1018) 6.0 | 5.5            | 1.63          | 13.13      |
| (2018-1019) 7.0 | 4.23           | 1.64          | 12.87      |

## Program Review Overview - Faculty Workload FTES and Efficiency : Version by Foley, Denise on 12/11/2019 21:20

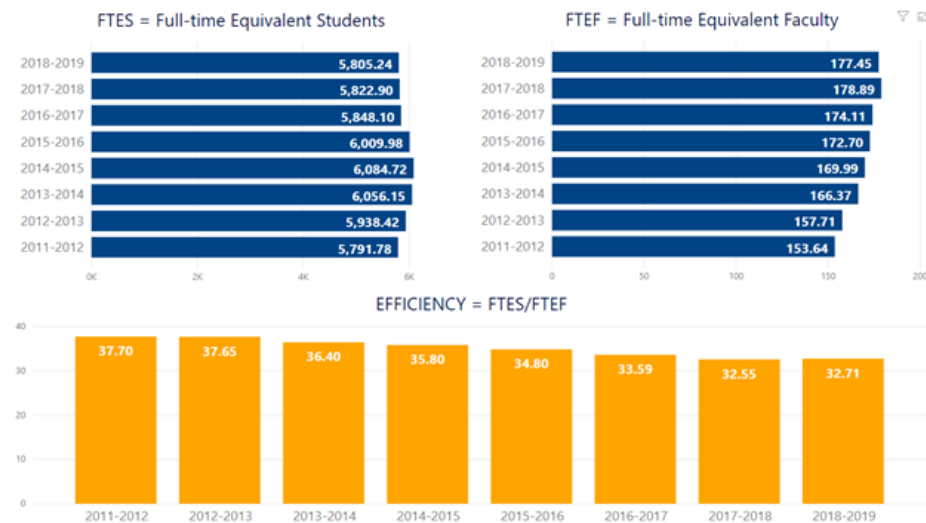
### Biology Department Data

#### Credit FTES, FTEF, and Efficiency Calculation



### Santiago Canyon College Campus Data

#### Credit FTES, FTEF, and Efficiency Calculation



The Biology Department is consistently more efficient than the campus as a whole. We try to support the efforts of efficiency by offering several sections of double lectures (or triple lectures) linked to laboratories as well as large lectures for Biology 109. We frequently fill laboratories to capacity. We, as a department, would appreciate being acknowledged in this area and be given some leeway to offer lower enrolled sections, at times. Overall we are a very efficient department.

| Total FTES | Overall Efficiency (FTES/FTEF) |
|------------|--------------------------------|
| undefined  | undefined                      |

## Goals and Objectives

### Program Review Goals & Objectives - Process and Mission Statement Alignment : Version by Foley, Denise on 12/11/2019 21:20

What processes does your program/service area follow to create, evaluate, and update annual plan goals?

The department as a whole meets during Flex week each semester to discuss new and ongoing goals of the department and institution, and how this relates to assignments and tasks for our department members. The most recent meeting spent significant time discussing goals of the Guided Pathways initiative and how that may impact departmental practices. Any actions to be undertaken are placed in tentative timeline at this time. Members are updated via email and small group meetings during the semester. We cannot meet as a department more frequently due to the variations in the teaching schedule for all of our members.

The department chairs seek input during and immediately following the Fall Flex meeting to update the Department Planning Portfolio (DPP).

How is SCC's mission statement (<https://www.scccollege.edu/About/Pages/CollegeMissionStatement.aspx>) reflected in your goals?

The majority of students that the department serves plan to transfer to a 4 year institution. Some students are seeking only a certificate in biotechnology such that they may obtain employment. Others are returning post-bacc students seeking to complete pre-requisites to graduate programs. Our courses are designed to transfer to the universities or to the B.S. in biomanufacturing and thus, support the basic tenant of the college's mission. The biotechnology program has expanded its offerings into the Career-Technical Education (CTE), and while the courses can transfer to specific B.S. degree programs at 2 community colleges, they are also highly skill-based and thus allow students to seek employment after completion.

Our department's DPP goals pertain to improving and maintaining an environment where intellectual growth and achievement is paramount; Where student's can achieve success in both their academic and personal goals. We aim to help students develop a solid foundation for their future academic endeavors. Biology and science courses, in general, require the development of the student's abilities to think critically, to test hypotheses, and to be able to interpret data. These requirements directly support the "learn", "act", and "think critically" components of the SCC mission statement.

| Education Master Plan Goals                                                                     | Department Goals Directly from DPP                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. Strengthen outreach and recruitment                                                          | <ul style="list-style-type: none"> <li>Work on our articulation agreements with the CSU and UC institutions.</li> <li>Work on developing the curriculum for a certificate and possibly A.S. for Health Science that includes the certification/license courses for a CNA certification.</li> <li>Continue to develop Biotechnology Internship courses and secure internship sites for biotechnology students.</li> <li>Continue to participate in pathway building activities with the local high schools.</li> </ul>                                       |
| 1. Align the college curriculum to focus on student completion of pathways                      | <ul style="list-style-type: none"> <li>Develop the new guided pathways for our Biology students.</li> <li>Continue to revise and present new biotechnology courses through the curriculum approval process.</li> <li>To develop a Health Science Degree for allied health students</li> <li>Offer a comprehensive program of courses.</li> </ul>                                                                                                                                                                                                            |
| 1. Promote an integrated approach to supporting student success                                 | <ul style="list-style-type: none"> <li>Develop the new guided pathways for our Biology students.</li> <li>To enhance student learning through activity based laboratories</li> <li>To improve student outcomes through SLO assessment</li> <li>Improve laboratory exercises in all courses to reflect current best practices in STEM education</li> <li>Directed learning activities and workshops on specific challenging topics will be developed and offered through the STAR center</li> </ul>                                                          |
| 1. Promote a college identity of high quality, academic excellence, and personalized education  | <ul style="list-style-type: none"> <li>Develop the new guided pathways for our Biology students.</li> <li>To post the new SLO assessment results on the Biology's website</li> <li>To improve student outcomes through SLO assessment</li> <li>Offer a comprehensive program of courses</li> <li>Improve laboratory exercises in all courses to reflect current best practices in STEM education</li> </ul>                                                                                                                                                 |
| 1. Support faculty in offering high quality instruction to students in the classroom and online | <ul style="list-style-type: none"> <li>Due to the past budget cuts; our department has not been given access to funds for replacement of broken and defective equipment in the last few years. Our DPP reflects this fact with many specific needs.</li> <li>Additional monies for supplies, equipment, and faculty/staff will be required to update our program.</li> </ul>                                                                                                                                                                                |
| 1. Maintain and enhance the college's technological infrastructure                              | <ul style="list-style-type: none"> <li>Again, we require funds to update our technological infrastructure.</li> <li>We need to replace 4 classrooms of Laptops that are outdated and unusable.</li> <li>We also need to replace broken lab room printers (3).</li> </ul>                                                                                                                                                                                                                                                                                    |
| 1. Maintain the facilities infrastructure                                                       | <ul style="list-style-type: none"> <li>Again, we require funds to maintain the facilities infrastructure.</li> <li>Purchase an instructor's desk for the major's laboratory rooms</li> <li>Add additional lighting to the existing laboratory rooms</li> </ul>                                                                                                                                                                                                                                                                                              |
| 1. Support and encourage focused green practices on campus                                      | <ul style="list-style-type: none"> <li>We have help create both the gardening club and Hawk's Pantry garden.</li> <li>We are using the greenhouse and land around the greenhouse to implement a garden for the Hawk's Nest Food Pantry.</li> </ul>                                                                                                                                                                                                                                                                                                          |
| 1. Develop and support an infrastructure related to web and social media                        | <ul style="list-style-type: none"> <li>To post the new Biotechnology programs on the Biology's website</li> <li>To post the new SLO assessment results on the Biology's website</li> </ul>                                                                                                                                                                                                                                                                                                                                                                  |
| 1. Support faculty development in the areas of innovative pedagogies and curriculum design      | <ul style="list-style-type: none"> <li>Rewrite Biology 200 and 259 courses</li> <li>Directed learning activities and workshops on specific challenging topics will be developed and offered through the STAR center</li> <li>Update biotechnology courses for the biotechnology program</li> <li>Faculty development in best practices in STEM education</li> <li>SLO updates/revision and ongoing assessment to assess students acquisition of basic knowledge of biological theories and ability to critically evaluate scientific information</li> </ul> |
| 1. Increase educational goal completion for university transfer, degrees, and certificates      | <ul style="list-style-type: none"> <li>Develop the new guided pathways for our Biology students.</li> <li>Offer a comprehensive program of courses</li> <li>Update biotechnology courses for the biotechnology program</li> <li>SLO updates/revision and ongoing assessment to assess students acquisition of basic knowledge of biological theories and ability to critically evaluate scientific information</li> </ul>                                                                                                                                   |

|                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. <b>Increase student learning and achievement through a culture of continuous quality improvement</b>                                                                       | <ul style="list-style-type: none"> <li>SLO updates/revision and ongoing assessment to assess students acquisition of basic knowledge of biological theories and ability to critically evaluate scientific information</li> <li>Faculty development in best practices in STEM education</li> <li>To improve student outcomes through SLO assessment</li> <li>To enhance student learning through activity based laboratories</li> <li>Improve laboratory exercises in all courses to reflect current best practices in STEM education</li> </ul> |
| 1. <b>Strengthen and develop relationships with key partners and stakeholders</b>                                                                                             | <ul style="list-style-type: none"> <li>With the development of our biotechnology program, we now hold annual advisory meetings.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                      |
| 1. <b>Develop sustainable, alternative revenue streams utilizing existing resources</b>                                                                                       | <ul style="list-style-type: none"> <li>The Biotechnology program has received equipment and supplies as well as personnel funded through 8 different grants, Perkins grants, and the Strong Workforce Program.</li> </ul>                                                                                                                                                                                                                                                                                                                       |
| 1. <b>Strengthen capacity to seek and acquire grant funding for the purpose of developing innovative programs and services that align with the college mission and vision</b> | <ul style="list-style-type: none"> <li>Continue to write and receive grants/funding for our Biotechnology Program</li> <li>Participated in Title V grant, Kaleidoscope grant, SSTEM grant, NSF ATE grant (with SAC)</li> </ul>                                                                                                                                                                                                                                                                                                                  |

## Program Review Goals & Objectives - Annual Plan Goals Not Aligned with EMP Goals : Version by **Foley, Denise** on **12/11/2019 21:20**

| Annual Plan Goal                                                                                                                                                                                                                         |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| The biology department strives to serve its students in all things. All of our goals, strategies, and implemented plans are made to improve student success and retention: Not only our biology major students, but all students of SCC. |
| One goal is to hire the needed support staff and addition faculty that are required to maintain our standard of excellence within the biology department:                                                                                |
| 1. Hire two ongoing 19 hour laboratory technicians                                                                                                                                                                                       |
| 2. Hire a second full-time instructor in microbiology                                                                                                                                                                                    |
|                                                                                                                                                                                                                                          |

## Data Analysis

### Program Review Data Analysis - 1 to 4 : Version by **Foley, Denise** on **12/11/2019 21:20**

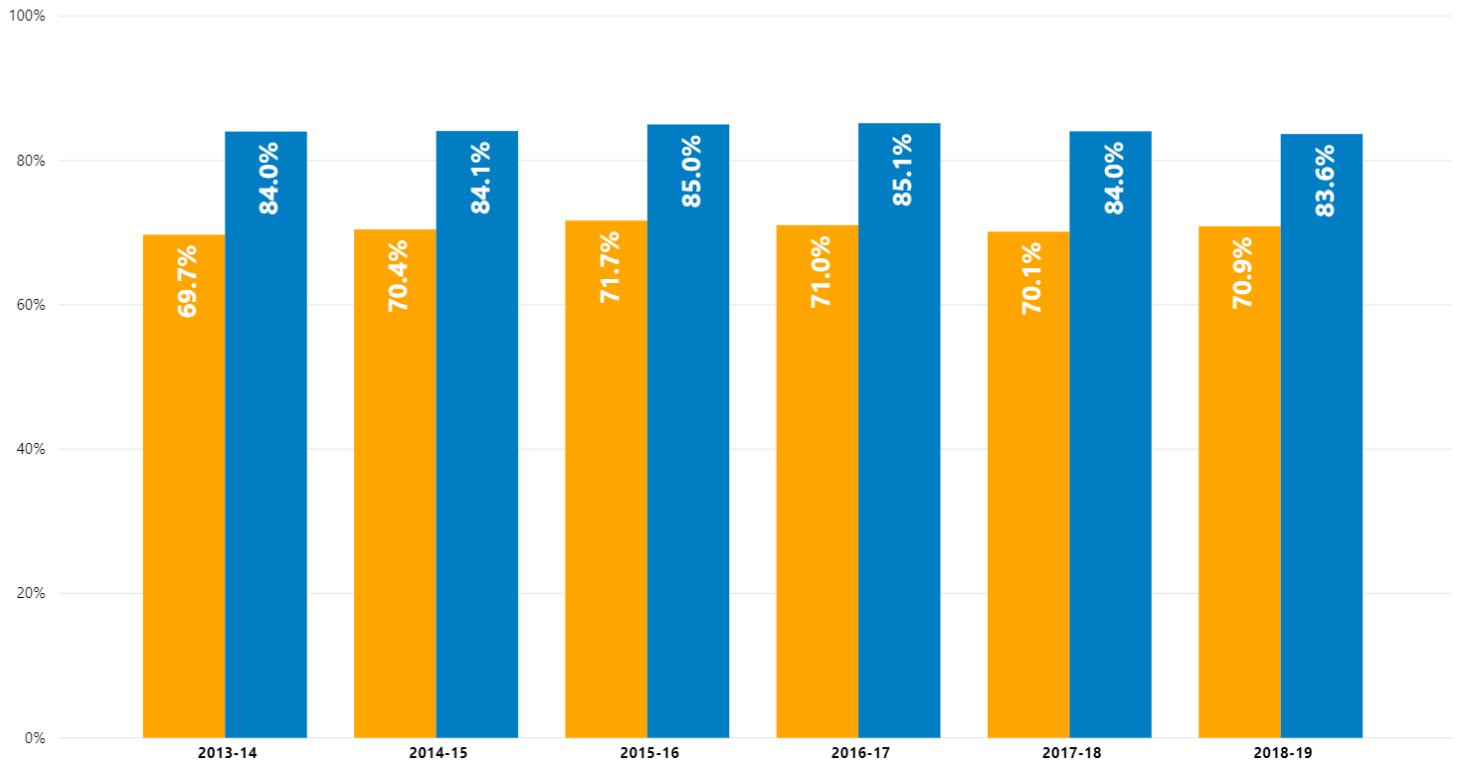
What is the successful course completion rate (grades of A, B, C, Credit or Pass) for courses within the program and how does this compare to the institution-set standard for successful course completion of **63%**?

SCC (not apprenticeship) success and retention values are overall a bit higher than our department's each year although we consistently exceed the standard of 63%. (SCC total values graph shown on top, while the Biology graph is the bottom figure)

See box below for comparison of retention and success values of our department to the SCC population and by ethnicity.

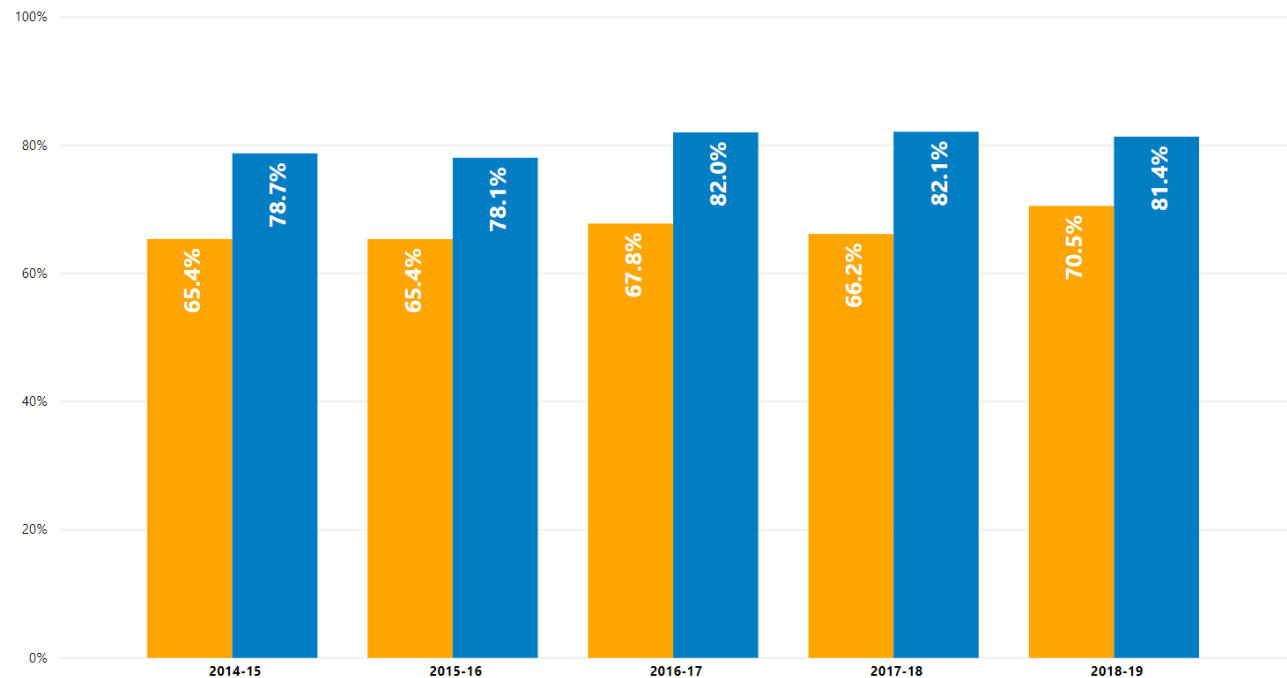
CURRENT SCC VALUES WITHOUT APPRENTICESHIP

● Success% ● Retention%



#### CURRENT BIOLOGY VALUES:

● Success% ● Retention%



**SUBJECTS**  
**BIOL**

What is the successful course completion rate in basic skills courses (grades of A, B, C, Credit or Pass) within the program?

We do not have a basic skills courses in the department.

What is the course retention rate (any grade except W) for courses within the program?

Comparison Table of SCC and Biology Department Success (S) / Retention (R) % Values of all students and Ethnic Groups In Last 2 Years

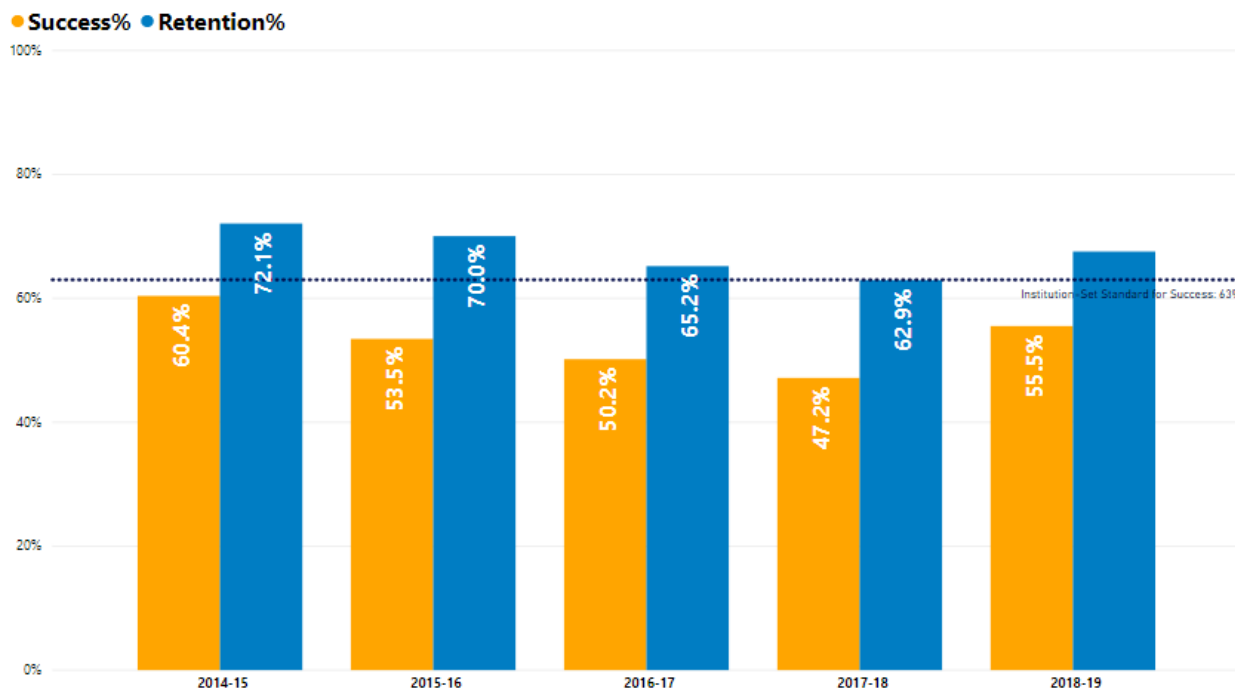
| success and retention by student population | SCC<br>2017-2018   | Biology<br>2017-1018 | SCC<br>2018-2019   | Biology<br>2018-2019 |
|---------------------------------------------|--------------------|----------------------|--------------------|----------------------|
|                                             | S/R<br>(headcount) | S/R<br>(headcount)   | S/R<br>(headcount) | S/R<br>(headcount)   |

| success and retention by student population | SCC<br>2017-2018<br>S/R<br>(headcount) | Biology<br>2017-1018<br>S/R<br>(headcount) | SCC<br>2018-2019<br>S/R<br>(headcount) | Biology<br>2018-2019<br>S/R<br>(headcount) |
|---------------------------------------------|----------------------------------------|--------------------------------------------|----------------------------------------|--------------------------------------------|
| all students                                | 72.6/88.2<br>(22,792)                  | 66.2/82.1<br>(2394)                        | 72.7/86.2<br>(18,510)                  | 70.5/81.4<br>(2217)                        |
| White                                       | 73.7/86<br>(4711)                      | 73/86<br>(675)                             | 76/87.7<br>(4981)                      | 75/85<br>(630)                             |
| Pacific Islander                            | 58.6/78.6<br>(56)                      | 42.9/42.9<br>(6)                           | 70.1/81.6<br>(64)                      | 50/50<br>(3)                               |
| Multi-Race                                  | 77.4/91.1<br>(2194)                    | 69.5/80<br>(214)                           | 77.2/88.4<br>(1432)                    | 77.4/84.3<br>(178)                         |
| Latino                                      | 68.1/85.8<br>(10,060)                  | 59.1/79.9<br>(1113)                        | 68.8/84.2<br>(8879)                    | 64.9/77.9<br>(1039)                        |
| Filipino                                    | 74.7/87.3<br>(301)                     | 74.5/85.7<br>(66)                          | 76.4/87.1<br>(324)                     | 77.7/85.1<br>(67)                          |
| Asian                                       | 76.5/90<br>(1546)                      | 75.3/84.1<br>(222)                         | 79.0/91.2<br>(1658)                    | 76.9/85<br>(217)                           |
| Am. Indian/<br>Alaskan native               | 71.9/87.5<br>(40)                      | 100/100<br>(1)                             | 71.6/87.5<br>(63)                      | 50/50<br>(3)                               |
| African Amer.                               | 56.6/80.6<br>(301)                     | 50/81<br>(30)                              | 64.8/82.2<br>(330)                     | 61/75<br>(36)                              |

Overall, many students achieve a lower success and retention rate in the biological sciences. Due to the challenging nature of the courses in this discipline, it is not surprising. In addition, like the campus-wide pattern, the biology department shows specific ethnic groups, (deemed impacted) achieving lower success and often lower retention rates compared to the campus as a whole, and compared to other ethnic groups. White, Asian, Filipino and multi-race populations do as well or better than the campus as a whole, however African Americans and Latinos do worse. It is hard to justify a conclusion for some populations which are very small, such as Pacific Islander or American Indian, but these populations do less well on the campus as a whole, so it is not surprising to see a lower success in our department (even though the small population makes it difficult to draw valid conclusions).

#### BIOLOGY 239 DATA

While some courses are consistently somewhat lower than the campus average, in the most recent years, most of our courses reflect a consistency in success and retention rates that are not too different from the overall campus patterns. However, there is an outlier with significantly lower success and retention rates compared to the campus and our own department. This course, Biology 239 (Human Anatomy) is the first course in the pre-nursing pathway and a prerequisite for the physiology course. We have served between 489-522 (headcount) students a year in this course in the past 3 reported years, which represents a significant number of students. Our headcount for the entire department in the past 3 years has ranged from 2217-2399. The lower success rate in this course is something we need to address.



Because our department is committed to the success of all students, we will participate in discussions and be willing to implement new ideas and practices that have been shown to improve the success of all students and especially students within these impacted populations. The biology 239 course is something we need to discuss further. We realize that many students are attracted to health science careers and attempt entry with this course. While not all will ultimately be successful, we should explore if there are methods that can be implemented to increase the success rate.

One possible reason for this low success rate in bio 239 is that the success rate is much lower in the fall than the spring semesters. This may be due to incoming freshman in the fall. Freshman may have a more difficult time in the course because of their inexperience with the demands of college. When students have had 1 or more semesters of college, they are more prepared for the challenges of bio 239 and thus we see a higher success rate in the spring terms.

What is the course retention rate in basic skills courses (any grade except W) within the program?

N/A

## Program Review Data Analysis - 5 : Version by Foley, Denise on 12/11/2019 21:20

The biology A.S. degree has been awarded more than our other degrees. This is likely due to the lower unit requirement. It is often chosen by students desiring a quick exit to transfer to universities, especially if not planning to transfer to CSU. The AS-T degree has more requirements and is specifically designed for the students transferring to CSU but it can work well for students planning to enter UC or other universities as well. This new degree was implemented in the past few years and we do not have a record of students earning this degree.

The Biotechnology A.S. degree is also a newer degree (we had not offered courses prior to 2013) and is designed for those students who wish to transfer to the low-cost B.S. in Biomanufacturing program at Mira Costa or Solano Community College.

Food safety has not been offered since enrollment was low. This class is being redesigned and the certificate is also being redesigned to be an entry level certification instead of a culminating certification.

We do not have any general biotechnology technician awards as of 2017-2018. This is the certification requiring the most courses and 37 units. Since we only began teaching the certificate courses in 2013, we will wait a few more years before we decide if this certification is too difficult to achieve and may need modification.

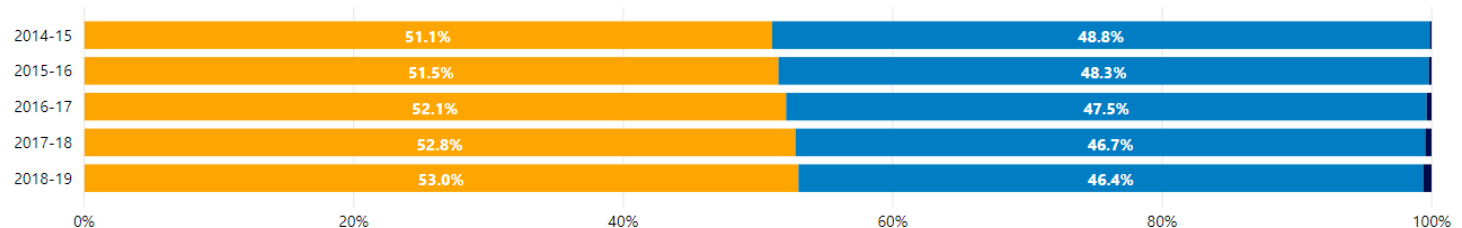
| Number of Awards in the Following Programs:          | 2014-2015 | 2015-2016 | 2016-2017 | 2017-2018 |
|------------------------------------------------------|-----------|-----------|-----------|-----------|
| Biology, AS                                          | 22        | 18        | 14        | 18        |
| Biology, AS-T                                        | 0         | 0         | 0         | 3         |
| Biotechnology Biomanufacturing Technician, CA        | 0         | 2         | 4         | 5         |
| Biotechnology Lab Assistant, CERT                    | 4         | 9         | 7         | 13        |
| Biotechnology Laboratory Technician: Food Safety, CA | 0         | 0         | 0         | 0         |
| Biotechnology, AS                                    | 2         | 3         | 5         | 2         |
| General Biotechnology Technician, CA                 |           |           |           |           |

## Program Review Data Analysis - 6 to 13 : Version by Foley, Denise on 12/11/2019 21:20

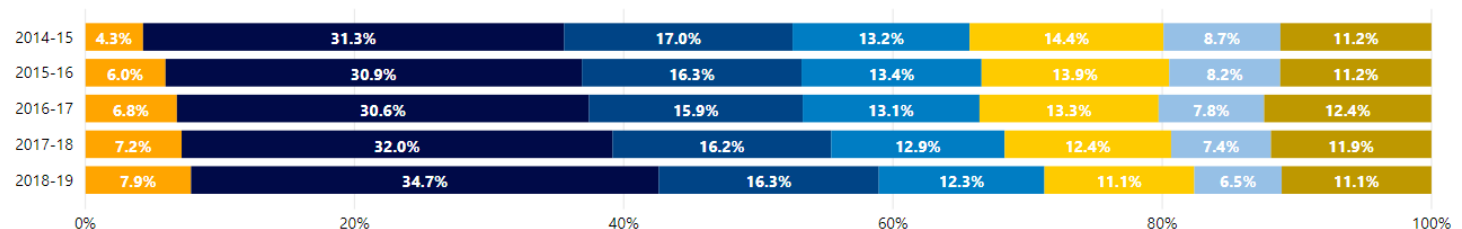
Are there any patterns, trends, or anomalies in the Student Demographic Data (Ethnicity, Age, Gender, Veteran Status, etc.)?

### CAMPUS DEMOGRAPHICS- NOT APPRENTICESHIPS

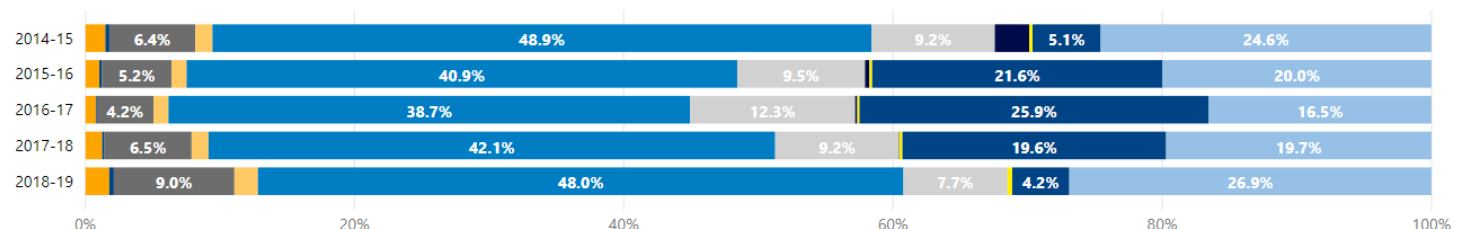
**Gender** ● Female ● Male ● Unknown



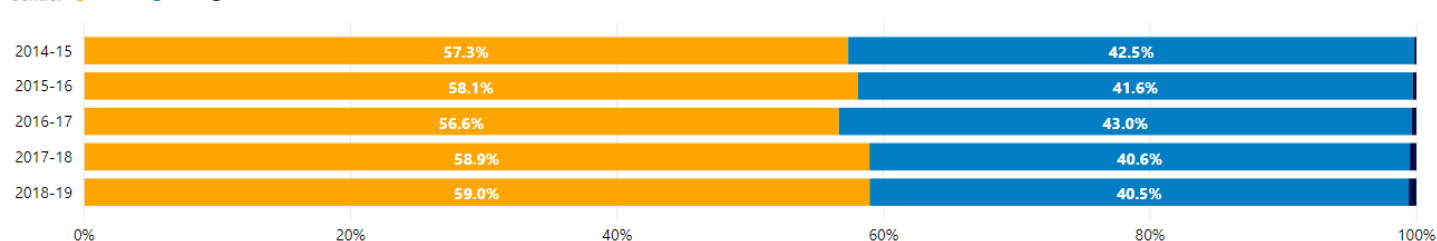
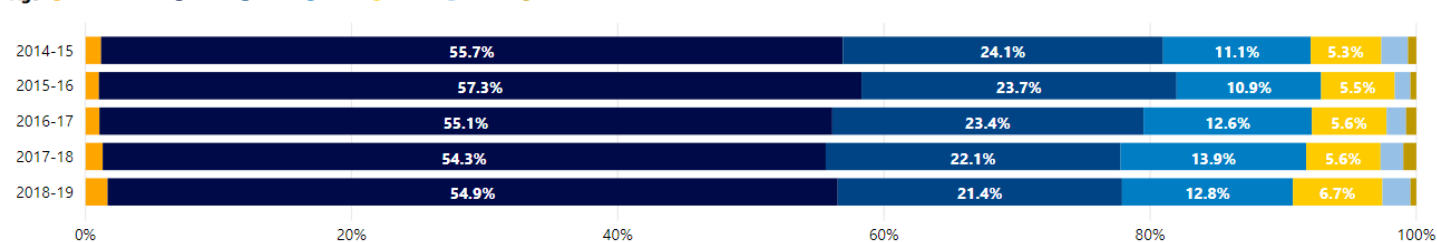
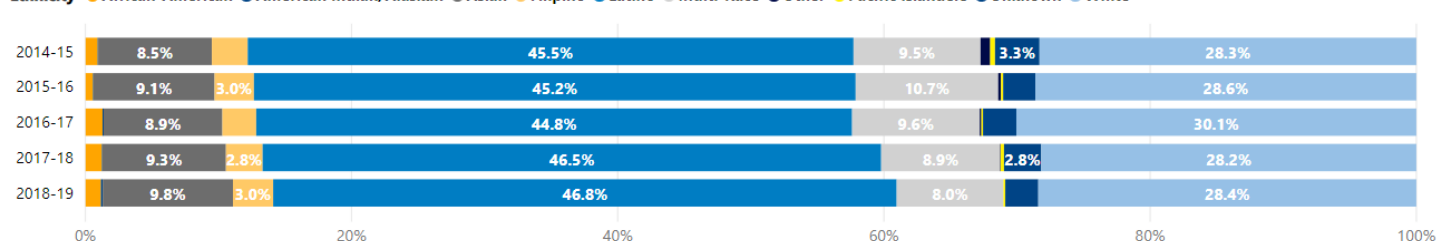
**Age** ● 17 and under ● 18-21 ● 22-24 ● 25-29 ● 30 - 39 ● 40 - 49 ● 50 and over ● Unknown



**Ethnicity** ● African-American ● American Indian/Alaskan ● Asian ● Filipino ● Latino ● Multi-Race ● Other ● Pacific Islanders ● Unknown ● White



### BIOLOGY DEMOGRAPHICS

**Gender** ● Female ● Male ● Unknown**Age** ● 17 and under ● 18-21 ● 22-24 ● 25-29 ● 30 - 39 ● 40 - 49 ● 50 and over**Ethnicity** ● African-American ● American Indian/Alaskan ● Asian ● Filipino ● Latino ● Multi-Race ● Other ● Pacific Islanders ● Unknown ● White

Our female population is slightly skewed higher because we have a significant proportion of our population pursuing pre-nursing requirements, which is a career choice historically dominated by females. We also skew slightly to white identified populations, but it is not a large shift.

Our department, especially the biotech program, is actively outreaching to our partner high schools and using other venues to try to inform and attract students. We are exploring ways to reach the more impacted groups.

Labor market trends and needs: Review the labor market data on the [California Employment Development Department \(http://www.labormarketinfo.edd.ca.gov/Content.asp?pageid=1011\)](http://www.labormarketinfo.edd.ca.gov/Content.asp?pageid=1011) website for jobs related to your program.

1. What occupations are related to your program?
2. What are the occupational projections for employment?
3. How do these projections affect planning for your program?

Biology majors at SCC largely intend to transfer to a 4-year University to complete a B.S. and perhaps go on to professional or graduate programs.

Health Science students intend to transfer into professional or bachelor degree programs such as nursing or other health-science professions.

Biotechnology students wish to transfer or seek employment.

The wages paid by entry level (middle-skilled) positions in the Health Science sector are better than minimum wage with plenty of room for advancement with more experience and, especially when coupled with more education (See below). The bottom line is that there is a great demand for this labor.

Biology majors tend to go on to higher postgraduate degrees, receiving even higher paid jobs: Post-docs, Doctor, Physicians Assistants, Dentists, PH. D, etc.

The wages paid by entry level (middle-skilled) positions in the Life Science (AKA biotechnology) sector are better than minimum wage with plenty of room for advancement with more experience and, especially when coupled with more education. This is a snapshot of the most recent analysis of Orange County. The bottom line is that there is a great demand for this labor and it is not yet being met with output of enough skilled workforce. Our biotechnology programs can help fill this need but we need an influx of students into the program. Our plan is to continue to offer the biotech certificates and A.S. degree, continue to work with our industry advisory to make curriculum relevant, and to work with our high school partners as well as other less traditional sources of students to increase the flow into our programs.

The information below is from: Center of Excellence (COE) Report: October 2019

**Exhibit 2. Life Sciences and Biotechnology Top Middle-Skill Jobs in Orange County: Entry-Level and Median Wages**

| SOC Code | SOC (Occupational) Title                                  | Demand (Annual Openings) | Entry-Level Wage (25 <sup>th</sup> Percentile) | Median Wage |
|----------|-----------------------------------------------------------|--------------------------|------------------------------------------------|-------------|
| 19-4099  | Life, Physical, and Social Science Technicians, All Other | 96                       | \$17.45                                        | \$23.32     |
| 49-9062  | Medical Equipment Repairers                               | 55                       | \$18.31                                        | \$22.61     |
| 51-9082  | Medical Appliance Technicians                             | 28                       | \$18.56                                        | \$24.52     |

While these occupations have entry-level wages below the \$17.39 per hour California Family Needs Calculator, occupations such as Inspectors, Testers, Sorters, Samplers, and Weighers; Chemical Technicians; Biological Technicians; and Ophthalmic Laboratory Technicians have median wages higher than the regional living wage, as denoted by the gray shading in Exhibit 4.

**Exhibit 4. Life Sciences and Biotechnology Middle-Skill Jobs with Entry-Level Earnings Below the California Family Needs Calculator in Orange County: Entry-Level and Median Wages**

| SOC Code | SOC (Occupational) Title                             | Demand (Annual Openings) | Entry-Level Wage (25 <sup>th</sup> Percentile) | Median Wage |
|----------|------------------------------------------------------|--------------------------|------------------------------------------------|-------------|
| 51-9061  | Inspectors, Testers, Sorters, Samplers, and Weighers | 884                      | \$14.46                                        | \$18.78     |
| 19-4031  | Chemical Technicians                                 | 91                       | \$16.64                                        | \$19.40     |
| 51-9011  | Chemical Equipment Operators and Tenders             | 55                       | \$12.46                                        | \$16.85     |
| 19-4021  | Biological Technicians                               | 57                       | \$16.88                                        | \$19.57     |
| 51-9083  | Ophthalmic Laboratory Technicians                    | 49                       | \$14.87                                        | \$17.44     |



Please provide comment on the rates of progress through the basic skills course sequence within your program using the California Community College Chancellor's Office Data Mart [Basic Skills Progress Tracker \(http://datamart.cccco.edu/Outcomes/BasicSkills\\_Cohort\\_Tracker.aspx\)](http://datamart.cccco.edu/Outcomes/BasicSkills_Cohort_Tracker.aspx).

We do not have basic skills courses in our programs.

Please provide comment on student survey results administered by the program, if any.

In Spring 2019, the biology department deployed a survey of either 7 or 8 questions to the student populations: Health science students in Biology 229, 239, 249, biology majors in Biol 211, 221, 231, and Biotech students in Bio 191. (94 majors, 114 health science students, and 17 Biol) A total of 191 students responded.

The **biology majors** responding to the survey were largely split between those who have taken one, two, or three biology courses. A minority have taken more biology courses which potentially include biology 109 or some of the biotechnology courses.

- The top 3 desired professions for our major students are physician/M.D., Veterinarian, and Physician assistant (P.A.). Environmental work was next followed by a plethora of other choices.
- The large majority of our students in the majors courses do not yet have a degree. Of those that do, B.S. degrees from CSUF and UCI were mentioned most frequently.
- Interestingly, the majority of our majors wish to transfer to UCI followed by CSUF then CSULB. UCSD and UCLA were the next most often listed top choices for transfer. Our department should ensure all our courses are articulating seamlessly to these programs.
- For our majors, most students believed they could take all the courses they needed to transfer here at SCC. The courses mentioned most often as courses students wished they could take were genetics, biochemistry, and pharmacology. One student mentioned marine biology. Of students who already have B.S. degrees, only 5 responded to which needed course was not offered. Medical terminology was mentioned twice and genetics once.
- Students with B.S. degrees, largely answer in the affirmative or are not certain whether they would enjoy project based learning in the laboratory courses. 23.1% of the students indicate a preference to NOT used project based learning. Among students who have not yet earned a degree, more than half of the students thought they would enjoy project based learning in the laboratory courses. Again, a bit less than a quarter of the students (24.1% ) indicate a preference to NOT used project based learning. Students that are not certain may not be familiar with this type of learning environment and may not be familiar with the benefits of this learning environment. Because project based learning is a well established mode of instruction that increases student engagement and retention of knowledge and more closely mimics true scientific investigation, our department may want to explore the incorporation of this teaching model into more of our laboratory courses.
- Students in our majors courses, who have already earned a degree, are mostly NOT looking to earn an additional degree or certificate from our college. A small number say they are or are not certain if they will. Conversely, almost 64% of the respondents who have not yet earned a degree state they are earning a degree at SCC. Of those that are not pursuing a degree here, the largest percentage indicated a desire to transfer but did not want or need a degree to do so.
- In summary, our department may wish to investigate project based learning in the laboratory, determine the possibility of offering genetics to transfer to UCI and CSUF, offering biochemistry, and we may want to decide if we want to target specific schools to market our courses.

At the time this survey was taken, our **health science student population** was largely split between those who were in their first, second, or third bio course. Typically, the students take

Anatomy (Bio 239,) Physiology (Bio 249), and General Microbiology (Bio 229) as prereqs for health science majors and programs. Some students have taken an additional biology course or two.

- Not surprisingly, all the students taking this survey intend to enter careers in health science. Nursing is, by far, the most intended occupation. Over 56% of our students intend to become a registered nurse or nurse practitioner. Physical therapists, medical doctors, and physician assistants occupy the next largest populations of near 10% each. Various other occupations in health science were named as well.
- Most (67.5%) of our students do not yet have a bachelor's degree. However, a significant portion (32.5%) already do. Of the respondents, the majority with degrees came from CSUF followed by UCI but various other schools were also named. Our department may want to target CSUF and UCI schools with marketing of our program. Our low cost, significant support services, and excellent instruction would be favorable characteristics to market to these students.
- The students with B.S. degrees look to Western College, Santa Ana, Saddleback and West Coast for further training. For students who have yet to earn a degree, perhaps surprisingly, the school most often listed as a school on the top 3 to transfer TO was CSULB. SAC and CSUF followed that and UCI was next. Golden West was the 5<sup>th</sup> most frequently cited school on a list of desired schools. Our department needs to investigate the requirements of the health science programs at these institutions, especially nursing (RN/NP/or BSN). We need to be certain our courses meet the requirements and we offer all the needed courses to transfer to these institutions.
- In regard to courses students wish they could take at SCC but can't, we may have some impacted classes that are preventing students from enrolling in their desired pathway. We need to monitor our waitlists and determine if we need to expand the offerings. In addition, we may wish to consider offering biochemistry for the students who need it. Biochemistry was listed as a top request by both the students with a degree as well as those working toward their degree. A couple students wanted more choices for microbiology (perhaps an evening offering) and they also mentioned the combo chemistry course that SAC offers but we do not as something a few students wished we had.
- Over half of the students with a B.S. and an even larger percentage of those without (74%) would be interested in pursuing the Certified Nursing Assistant Program now housed in Non-credit. Our department should look to coordinating with this program to develop a certificate. It would be a large draw that could be used in marketing our health science program.
- Again, 59.5% of B.S. students and over 84% of students who have yet to earn a degree would be interested in a certificate or A.S. degree even if they had to take an extra course or two to earn it. Our department should look into the CNA program here and see if we can collaborate on a certificate.
- In summary, we may need to offer biochemistry in our department if chemistry is not going to take up the course as a cross list. We also should look closely at our waitlists. Lastly, the CNA program is of great interest to the majority of our students who have indicated a willingness to take an extra couple courses in order to earn a certificate. The biology department should collaborate on the development of a health science certificate that incorporates the certified nursing assistant preparation into the training.

At the time of this survey (Summer 2019), only one section of **biotechnology** Biol 191 was offered in the biotech program. 17 students in the class responded.

- 10 of the students intended to work in industry, research and development in industry or in academic research. The other students had a variety of other goals.
- 4/16 did not know if they intended to pursue a biotech certificate or degree
- 5 students intended to pursue one or more certificates only
- 6 students intended to pursue the A.S. in biotechnology
- only one of the 16 students answering had a B.S. degree already
- 4 of the students learned of the program from a presentation made in their classroom
- 3 learned of the program from the banner hanging on the science center
- The remaining students heard about the program from counselors, early welcome and their friends

Please provide comment on program exit exams or other assessments of graduating students, if any.

No exit exams are available or planned at this time.

Please provide the number of students who take and pass external license examinations, if relevant to the program.

No external licensing is available for our students at this time.

Please provide data on former students' post-SCC experiences (e.g. transfer success, career advances, post-graduation surveys), if any.

The only data we have of this kind is Anecdotal. Many of our students tell us that they are more prepared for their upper division courses than their counterpart students from both UC and CSU. They feel that they were lucky to have had the opportunity to study at SCC and have gained from the experience.

Please provide data pertaining to the instruction or delivery of service, if any.

NA

## Outcomes Assessment

### Program Review Outcomes Assessment - Course and Section Count : Version by **Foley, Denise** on **11/03/2019 23:04**

| Courses                                                    | Section Count |
|------------------------------------------------------------|---------------|
| BIOL109 - Fundamentals of Biology                          | 13            |
| BIOL109 - Fundamentals of Biology                          | 4             |
| BIOL109H - Honors Fundamentals of Biology                  | 2             |
| BIOL109H - Honors Fundamentals of Biology                  | 1             |
| BIOL109L - Fundamentals of Biology Laboratory              | 20            |
| BIOL109L - Fundamentals of Biology Laboratory              | 8             |
| BIOL115 - Concepts in Biology for Educators                | 2             |
| BIOL115 - Concepts in Biology for Educators                | 1             |
| BIOL139 - Health Microbiology                              | 1             |
| BIOL149 - Human Anatomy and Physiology                     | 1             |
| BIOL149 - Human Anatomy and Physiology                     | 1             |
| BIOL190 - Introduction to Biotechnology                    | 2             |
| BIOL190 - Introduction to Biotechnology                    | 1             |
| BIOL190L - Introduction to Biotechnology Lab               | 2             |
| BIOL190L - Introduction to Biotechnology Lab               | 1             |
| BIOL191 - Biotech A: Basic Lab Skills                      | 1             |
| BIOL193 - Biotech C: Nucleic Acids                         | 1             |
| BIOL194 - Quality and Regulatory Compliance in Biosciences | 1             |
| BIOL202 - Cell Culture Techniques                          | 1             |

| Courses                                  | Section Count |
|------------------------------------------|---------------|
| BIOL211 - Cellular and Molecular Biology | 3             |
| BIOL211 - Cellular and Molecular Biology | 4             |
| BIOL221 - Animal Diversity and Evolution | 1             |
| BIOL221 - Animal Diversity and Evolution | 2             |
| BIOL229 - General Microbiology           | 2             |
| BIOL229 - General Microbiology           | 4             |
| BIOL231 - Plant Diversity and Ecology    | 1             |
| BIOL231 - Plant Diversity and Ecology    | 2             |
| BIOL239 - General Human Anatomy          | 16            |
| BIOL239 - General Human Anatomy          | 7             |
| BIOL249 - Human Physiology               | 12            |
| BIOL249 - Human Physiology               | 6             |
| BIOL259 - Environmental Biology          | 1             |
| BIOL259 - Environmental Biology          | 2             |

### Program Review Outcomes Assessment - CSLOs : Version by **Foley, Denise** on 12/11/2019 21:20

| Student Learning Outcomes                                                                                                                                                                | CSLO Count | CSLOs Measured |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|----------------|
| BIOL109 - Fundamentals of Biology                                                                                                                                                        | 2          | 2              |
| Identify and explain the characteristics of living organisms in a clear and concise manner.                                                                                              |            |                |
| Demonstrate a coherent understanding of evolution and its relationship to the unity and diversity of living organisms.                                                                   |            |                |
| BIOL115 - Concepts in Biology for Educators                                                                                                                                              | 2          | 2              |
| Identify and explain the characteristics of living organisms in a clear and concise manner.                                                                                              |            |                |
| Demonstrate a coherent understanding of evolution and its relationship to the unity and diversity of living organisms.                                                                   |            |                |
| BIOL149 - Human Anatomy and Physiology                                                                                                                                                   | 3          | 3              |
| Appropriately apply anatomical and directional terminology commonly used in the medical profession to body structures.                                                                   |            |                |
| Demonstrate a coherent understanding of the relationship between tissues, organs, and organ systems from a structural and functional perspective.                                        |            |                |
| Properly utilize and care for laboratory equipment following conventional procedures.                                                                                                    |            |                |
| BIOL190 - Introduction to Biotechnology                                                                                                                                                  | 2          | 2              |
| Demonstrate knowledge of the fundamental biotechnology concepts that include basic molecular biology, industrial applications, a brief history of the field, and ethical considerations. |            |                |
| Demonstrate a proficiency in the techniques used for scientific communication.                                                                                                           |            |                |
| BIOL211 - Cellular and Molecular Biology                                                                                                                                                 | 3          | 3              |
| Express a coherent understanding of fundamental biological concepts that include cell structure, energy, cell reproduction, and genetics.                                                |            |                |
| Employ the principles of the scientific method to investigate both laboratory and ordinary situations.                                                                                   |            |                |
| Conduct laboratory investigations according to given experimental procedure, collect and analyze resulting experimental data, and formulate valid conclusions based on the results.      |            |                |
| BIOL221 - Animal Diversity and Evolution                                                                                                                                                 | 3          | 3              |
| Demonstrate a coherent understanding of the relationship between animal diversity, form and function, behavior, and life style.                                                          |            |                |

| Student Learning Outcomes                                                                                                                                                           | CSLO Count | CSLOs Measured |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|----------------|
| Express a fundamental comprehension of the process of evolution and its relationship to animal diversity.                                                                           |            |                |
| Conduct laboratory investigations according to given experimental procedure, collect and analyze resulting experimental data, and formulate valid conclusions based on the results. |            |                |
| BIOL229 - General Microbiology                                                                                                                                                      | 3          | 3              |
| Demonstrate knowledge of the diversity of microorganisms and their role in the biosphere.                                                                                           |            |                |
| Employ the principles of the scientific method to both laboratory and conventional investigations.                                                                                  |            |                |
| Conduct laboratory investigations according to given experimental procedure, collect and analyze resulting experimental data, and formulate valid conclusions based on the results. |            |                |
| BIOL231 - Plant Diversity and Ecology                                                                                                                                               | 3          | 3              |
| Demonstrate a coherent understanding of the relationship between plant diversity, form and function, habitat, and life style.                                                       |            |                |
| Express a fundamental comprehension of ecological principles by citing examples.                                                                                                    |            |                |
| Conduct laboratory investigations according to given experimental procedure, collect and analyze resulting experimental data, and formulate valid conclusions based on the results. |            |                |
| BIOL239 - General Human Anatomy                                                                                                                                                     | 3          | 3              |
| Appropriately apply anatomical and directional terminology commonly used in the medical profession.                                                                                 |            |                |
| Identify anatomical features of the body on a microscopic and/or gross level and indicate the relative location of each.                                                            |            |                |
| Properly utilize and care for laboratory equipment following conventional procedures.                                                                                               |            |                |
| BIOL249 - Human Physiology                                                                                                                                                          | 3          | 3              |
| Illustrate a fundamental understanding of basic cellular chemistry and its role in homeostasis.                                                                                     |            |                |
| Demonstrate a coherent understanding of the relationship between tissues, organs, and organ systems from a structural and functional perspective.                                   |            |                |
| Conduct laboratory investigations according to given experimental procedure, collect and analyze resulting experimental data, and formulate valid conclusions based on the results. |            |                |
| BIOL259 - Environmental Biology                                                                                                                                                     | 3          | 3              |
| Demonstrate a cohesive understanding of the relationship between ecosystems, populations, and pollutants.                                                                           |            |                |
| Express a fundamental comprehension of ecological principles.                                                                                                                       |            |                |
| Conduct laboratory investigations according to given experimental procedure, collect and analyze resulting experimental data, and formulate valid conclusions based on the results. |            |                |
| BIOL109H - Honors Fundamentals of Biology                                                                                                                                           | 2          | 2              |
| Identify and explain the definitive characteristics of living organisms in a clear and concise manner.                                                                              |            |                |
| Demonstrate a coherent understanding of evolution and its relationship to the unity and diversity of living organisms.                                                              |            |                |
| BIOL109L - Fundamentals of Biology Laboratory                                                                                                                                       | 2          | 2              |
| Apply the steps of the scientific method to conduct laboratory investigations.                                                                                                      |            |                |

| Student Learning Outcomes                                                                                                                                                           | CSLO Count | CSLOs Measured |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|----------------|
| Conduct laboratory investigations according to given experimental procedure, collect and analyze resulting experimental data, and formulate valid conclusions based on the results. |            |                |
| BIOL 190L - Introduction to Biotechnology Lab                                                                                                                                       | 2          | 2              |
| Clone a gene into a plasmid and have bacteria express the gene.                                                                                                                     |            |                |
| Communicate laboratory results clearly to others.                                                                                                                                   |            |                |

## Program Review Outcomes Assessment - PSLOs : Version by Foley, Denise on 12/11/2019 21:20

| Program Student Learning Outcomes                                                                                | PSLO Count | PSLOs Measured |
|------------------------------------------------------------------------------------------------------------------|------------|----------------|
| <b>Biology*</b>                                                                                                  |            |                |
| PSLO                                                                                                             |            |                |
| Biology, AS                                                                                                      |            |                |
|                                                                                                                  | 2          | 0              |
| Demonstrate an understanding of the basic theories of biology.                                                   |            |                |
| Demonstrate a knowledge of and an ability to apply and effectively communicate the scientific method.            |            |                |
| Biology, AS-T                                                                                                    |            |                |
|                                                                                                                  | 2          | 0              |
| Demonstrate an understanding of the basic theories of biology.                                                   |            |                |
| Demonstrate a knowledge of and an ability to apply and effectively communicate the scientific method.            |            |                |
| Biotechnology Biomanufacturing Technician, COA                                                                   |            |                |
|                                                                                                                  | 4          | 0              |
| Demonstrate an understanding of and follow workplace safety guidelines.                                          |            |                |
| Demonstrate proficiency in following standard operating procedures (SOPs).                                       |            |                |
| Properly maintain a laboratory notebook.                                                                         |            |                |
| Understand and correctly operate laboratory equipment.                                                           |            |                |
| Biotechnology Lab Assistant, CERT                                                                                |            |                |
|                                                                                                                  | 1          | 0              |
| Develop knowledge necessary to select and develop Science, Technology, Engineering & Mathematics (STEM) careers. |            |                |
| Biotechnology Laboratory Technician: Food Safety, COA                                                            |            |                |
|                                                                                                                  | 4          | 0              |
| Demonstrate an understanding of and follow workplace safety guidelines.                                          |            |                |
| Demonstrate proficiency in following standard operating procedures (SOPs) as it pertains to food safety.         |            |                |
| Properly maintain a laboratory notebook.                                                                         |            |                |
| Understand and correctly operate laboratory equipment.                                                           |            |                |
| Biotechnology, AS                                                                                                |            |                |
|                                                                                                                  | 4          | 0              |
| Demonstrate an understanding of and follow workplace safety guidelines.                                          |            |                |
| Demonstrate proficiency in following standard operating procedures (SOPs).                                       |            |                |
| Properly maintain a laboratory notebook.                                                                         |            |                |
| Understand and correctly operate laboratory equipment.                                                           |            |                |
| General Biotechnology Technician, COA                                                                            |            |                |
|                                                                                                                  | 4          | 0              |

| Program Student Learning Outcomes                                          | PSLO Count | PSLOs Measured |
|----------------------------------------------------------------------------|------------|----------------|
| Demonstrate an understanding of and follow workplace safety guidelines.    |            |                |
| Demonstrate proficiency in following standard operating procedures (SOPs). |            |                |
| Properly maintain a laboratory notebook.                                   |            |                |
| Understand and correctly operate laboratory equipment.                     |            |                |

## Program Review Outcomes Assessment - Assessment of CSLOs and PSLOs : Version by **Foley, Denise** on 12/11/2019 21:20

How does the program/service area systematically assess student learning outcomes and/or service area outcomes using specific and measurable performance criteria?

Program student learning outcomes had previously been assessed individually. However, with the introduction of Taskstream a mapping activity was undertaken to link the course SLOs to the Program SLOs. It was our understanding we would be able to collect data on the PSLOs in this way. However the data is not available at this time. With the introduction of eLumen, this should be available once again after the mapping is completed.

What is your assessment cycle, how are assessments carried out, and who is involved in the assessment process?

We have an assessment cycle such that each course SLO is assessed at least one time in a 3 year cycle. Each course instructor carries out the assessment. Assessments have been developed by the course instructor or agreed upon by a set of instructors that teach the same course. Course leads collect and analyze the set of assessment in a given semester. The department chair in charge of the SLOs collects and submits all the assessments for a semester (at this time).

Upon review of *course student learning outcome assessment data*, give at least one specific example of:

1. A *course student learning outcome* which students have definitely met and why you think students were successful.
2. A *course student learning outcome* which students have definitely **not** met and why you think students were unsuccessful. What changes have you considered making?

In Spring 2016, one section of Human Anatomy (Biology 239) was analyzed for "Identify the anatomical features of the body on a microscopic and/or gross level and indicate the relative location of each". The instructor embedded 2 questions on the selected topic in a laboratory exams. The first question asked students to identify a tissue, while the second question asked students about location of that tissue. After reviewing the data, the instructor found that students were able to recognize the tissue (71% of students answered the question successfully), however only 51% of students could accurately state where that tissue is found in the body. Because of this analysis, the instructor changed the way instruction of this topic occurred in the following semester and spent more time reinforcing this topic during the lecture and supplemented the tissue identification in lab.

In Fall of 2016, in Physiology (Biology 249), an assessment of "Demonstrate a coherent understanding of the relationship between tissues, organs, and organ systems from a structural and functional perspective" was undertaken. Included were 2 questions that focused on the urinary system. Analysis of the SLO data showed lower than expected success. On average, only 57% of the students answered those 2 questions correctly. Because of this result, the instructor realized the topic was not adequately covered during lecture so a revision to the content occurred such that more significant time and emphasis is placed on this topic.

In Spring 2017 SLO assessment was completed for Biology 239 focusing on the following outcome: "Appropriately apply anatomical and directional terminology commonly used in the medical profession for body structures". Analysis shows that 74.5% of students were able to answer both questions on this topic correctly. The instructor was pleased with this result as they had specifically created a worksheet for the course to increase student retention on this topic.

What changes has the program **already** made based on its assessment of *course student learning outcomes*? Give specific examples and describe how you know if the changes have increased success?

Based on a previous Bio 221 SLO outcome of only 57%, we implemented new lab activities and exercises. We have rewritten every lab activity and exercise to increase student participation, hands-on participation and student retention of the material. It has taken us over 1 1/2 years to develop and implement these new activities and exercises. We are just now starting to access the SLO's from these new activities, so we should have some results soon, but not at the time of this program review.

Upon review of *program student learning outcome assessment data*, what patterns, trends, or anomalies did your program identify?

We do not have recent data available for this analysis.

## Curriculum and Program Management

### Program Review - Curriculum and Program Management : Version by **Foley, Denise** on 12/11/2019 21:20

With **SCC's Mission Statement** in mind, explain how your program/service area meets the academic, developmental, and vocational needs of SCC's diverse student population?

The Biology department program offers the appropriate courses to meet the academic needs of the non-Biology (GE) students, the Biology major students, the Allied Health students, and the biotechnology students. The Biology department utilizes a variety of learning aids including verbal, visual, mathematical, and hands-on experiences in the classroom to help develop and advance the knowledge of students. In order to further our student's education experience, we offer various learning opportunities outside of the classroom such as: SI (peer-led group study sessions), Star Center tutoring, guest speakers, STEM summer research opportunities, biotechnology internships, and various field trips.

Does your program/service area offer sufficient courses, workshops or other services, with sufficient frequency, at appropriate times, and through appropriate delivery modes to meet the major requirements, transfer goals, and general education, co-curricular, and elective needs of the student body? If not, list what changes would help accomplish this.

We offer our health science and majors courses with sufficient regularity. We still have large waitlists for specific courses, such as Anatomy, on a routine basis. We attempt to manage waitlists and open other sections when possible, however, instructor and room availability can limit this effort to some degree.

Biotechnology program courses are offered less frequently than ideal due to lower enrollment than hoped, despite good employment opportunities in the region. We are actively working on increasing our links to high schools and other populations that would be interested in entering this pathway. More students will help stabilize the program so we can offer the courses regularly. We also offer workshops at least one time a semester on biotechnology topics, mostly for recruiting interested students in biotechnology. The faculty do this voluntarily for the benefit of the program and our future students. The largest impediment to offering the courses more regularly is the lack of a steady student population. The recruitment effort takes much faculty time and effort. Increased marketing of the program by others dedicated to this task would be very helpful. The most beneficial outcome would be a pathway bridge from high school to our program but this requires the high schools to build part of the bridge. We are attempting to inspire them to do so but it is a difficult endeavor.

While the majority of non-majors opt to take Biology 109 lecture and laboratory to fulfill their life science GE requirements, in reality the Biology department has a variety of courses that can meet this need. Students may opt for other choices depending on where they desire to transfer. It would be better for students to be made aware of these choices as many seem to believe that Biology 109/109L was the only option for them.

The following Biology Courses fulfill all 3 GE transfer patterns: Plan A local, Plan B CSU, Plan C IGETC

Biology 109/109L and Biology 109H Fundamental of Biology (and honors section)  
 Biology 115 Concepts in Biology for Educators  
 Biology 139 Health Microbiology  
 Biol 149 Human Anatomy and Physiology  
 Biology 190/190L Introduction to Biotechnology lecture and laboratory  
 Biology 211 Cellular and Molecular Biology  
 Biology 239 Human Anatomy  
 Biology 259 Environmental Biology

As mentioned above, the health science students desire a clear path to earn the CNA license. We need to explore incorporating this into our program in some manner.

Does your program/service area offer learning opportunities that extend beyond the traditional classroom experience?

We also offer SI for various courses; Bio 239, 249, 211, 229, etc. Supplemental instruction has been a wonderful experience for our students. Students using these services do better overall. Thus our department supports these services and desires that the college fully support them with necessary resources.

Our department actively encourages our students to utilize the STAR center and Supplemental Instruction (SI ) when available. The data show this is extremely helpful for our students. Students using these services do better overall. Thus our department supports these services and desires that the college fully support them with necessary resources. The relevant data is shown below for the most recent semester available, however the pattern is similar each semester.

### STAR Center Success Rates Grade Distribution Biology 211 Spring 2019

| STAR Center Student Participation/Grade Distribution<br>1 or more visits<br>N= 34 |                    |    |         | STAR Center Student Participation/Grade Distribution<br>0 visits<br>N= 60 |                    |    |         |
|-----------------------------------------------------------------------------------|--------------------|----|---------|---------------------------------------------------------------------------|--------------------|----|---------|
| Grade                                                                             | Number of Students | %  | Total % | Grade                                                                     | Number of Students | %  | Total % |
| A                                                                                 | 11                 | 32 | 85      | A                                                                         | 10                 | 16 | 58      |
| B                                                                                 | 6                  | 18 |         | B                                                                         | 7                  | 12 |         |
| C                                                                                 | 12                 | 35 |         | C                                                                         | 18                 | 30 |         |
| D                                                                                 | 1                  | 3  | 15      | D                                                                         | 3                  | 5  | 42      |
| F                                                                                 | 2                  | 6  |         | F                                                                         | 4                  | 7  |         |
| W                                                                                 | 2                  | 6  |         | W                                                                         | 18                 | 30 |         |

### STAR Center Success Rates Grade Distribution Biology 221 Spring 2019

| STAR Center Student Participation/Grade Distribution<br>1 or more visits<br>N= 24 |                    |    |         | STAR Center Student Participation/Grade Distribution<br>0 visits<br>N= 10 |                    |    |         |
|-----------------------------------------------------------------------------------|--------------------|----|---------|---------------------------------------------------------------------------|--------------------|----|---------|
| Grade                                                                             | Number of Students | %  | Total % | Grade                                                                     | Number of Students | %  | Total % |
| A                                                                                 | 6                  | 25 | 83      | A                                                                         | 2                  | 20 | 70      |
| B                                                                                 | 7                  | 29 |         | B                                                                         | 5                  | 50 |         |
| C                                                                                 | 7                  | 29 |         | C                                                                         | 0                  | 0  |         |
| D                                                                                 | 2                  | 9  | 17      | D                                                                         | 1                  | 10 | 30      |
| F                                                                                 | 1                  | 4  |         | F                                                                         | 2                  | 20 |         |
| W                                                                                 | 1                  | 4  |         | W                                                                         | 0                  | 0  |         |

STAR Center Success Rates  
Grade Distribution  
Biology 229 Spring 2019

| STAR Center Student Participation/Grade Distribution<br>1 or more visits<br>N= 56 |                    |    |         | STAR Center Student Participation/Grade Distribution<br>0 visits<br>N= 14 |                    |    |         |
|-----------------------------------------------------------------------------------|--------------------|----|---------|---------------------------------------------------------------------------|--------------------|----|---------|
| Grade                                                                             | Number of Students | %  | Total % | Grade                                                                     | Number of Students | %  | Total % |
| A                                                                                 | 15                 | 27 | 84      | A                                                                         | 2                  | 14 | 50      |
| B                                                                                 | 24                 | 43 |         | B                                                                         | 2                  | 14 |         |
| C                                                                                 | 8                  | 14 |         | C                                                                         | 3                  | 22 |         |
| D                                                                                 | 2                  | 4  | 16      | D                                                                         | 1                  | 7  | 50      |
| F                                                                                 | 0                  | 0  |         | F                                                                         | 0                  | 0  |         |
| W                                                                                 | 6                  | 11 |         | W                                                                         | 6                  | 43 |         |
| I                                                                                 | 1                  | 2  |         | I                                                                         | 0                  | 0  |         |

STAR Center Success Rates  
Grade Distribution  
Biology 231 Spring 2019

| STAR Center Student Participation/Grade Distribution<br>1 or more visits<br>N= 15 |                    |    |         | STAR Center Student Participation/Grade Distribution<br>0 visits<br>N= 19 |                    |    |         |
|-----------------------------------------------------------------------------------|--------------------|----|---------|---------------------------------------------------------------------------|--------------------|----|---------|
| Grade                                                                             | Number of Students | %  | Total % | Grade                                                                     | Number of Students | %  | Total % |
| A                                                                                 | 9                  | 60 | 87      | A                                                                         | 5                  | 26 | 84      |
| B                                                                                 | 4                  | 27 |         | B                                                                         | 7                  | 37 |         |
| C                                                                                 | 0                  | 0  |         | C                                                                         | 4                  | 21 |         |
| D                                                                                 | 0                  | 0  | 13      | D                                                                         | 0                  | 0  | 16      |
| F                                                                                 | 1                  | 7  |         | F                                                                         | 0                  | 0  |         |
| W                                                                                 | 1                  | 7  |         | W                                                                         | 3                  | 16 |         |

STAR Center Success Rates  
Grade Distribution  
Biology 239 Spring 2019

| STAR Center Student Participation/Grade Distribution<br>1 or more visits<br>N= 63 |                    |    |         | STAR Center Student Participation/Grade Distribution<br>0 visits<br>N= 174 |                    |    |         |
|-----------------------------------------------------------------------------------|--------------------|----|---------|----------------------------------------------------------------------------|--------------------|----|---------|
| Grade                                                                             | Number of Students | %  | Total % | Grade                                                                      | Number of Students | %  | Total % |
| A                                                                                 | 21                 | 33 | 70      | A                                                                          | 31                 | 18 | 49      |
| B                                                                                 | 10                 | 16 |         | B                                                                          | 30                 | 17 |         |
| C                                                                                 | 13                 | 21 |         | C                                                                          | 25                 | 14 |         |
| D                                                                                 | 2                  | 3  | 30      | D                                                                          | 7                  | 4  | 51      |
| F                                                                                 | 2                  | 3  |         | F                                                                          | 11                 | 7  |         |
| W                                                                                 | 15                 | 24 |         | W                                                                          | 70                 | 40 |         |

STAR Center Success Rates  
Grade Distribution  
Biology 249 Spring 2019

| STAR Center Student Participation/Grade Distribution<br>1 or more visits<br>N= 37 |                    |    |         | STAR Center Student Participation/Grade Distribution<br>0 visits<br>N= 154 |                    |    |         |
|-----------------------------------------------------------------------------------|--------------------|----|---------|----------------------------------------------------------------------------|--------------------|----|---------|
| Grade                                                                             | Number of Students | %  | Total % | Grade                                                                      | Number of Students | %  | Total % |
| A                                                                                 | 10                 | 27 | 73      | A                                                                          | 35                 | 23 | 70      |
| B                                                                                 | 9                  | 24 |         | B                                                                          | 46                 | 30 |         |
| C                                                                                 | 8                  | 22 |         | C                                                                          | 27                 | 17 |         |
| D                                                                                 | 4                  | 11 | 27      | D                                                                          | 11                 | 7  | 30      |
| F                                                                                 | 0                  | 0  |         | F                                                                          | 7                  | 5  |         |
| W                                                                                 | 6                  | 16 |         | W                                                                          | 28                 | 18 |         |

SUPPLEMENTAL INSTRUCTION DATA: Summary table- 4 Biology courses with SI offered in Spring 2019  
Data has a similar pattern for each semester

| All Classes Combined |       |     |       | Did Not |       |     |         |
|----------------------|-------|-----|-------|---------|-------|-----|---------|
| Grade                | Part. | %   |       | Grade   | Part. | %   | Total % |
| A                    | 82    | 22% |       | A       | 80    | 12% |         |
| B                    | 96    | 26% | Total | B       | 110   | 16% | Total % |
| C                    | 86    | 24% | 72%   | C       | 99    | 15% | 43%     |
| D                    | 24    | 24% |       | D       | 48    | 13% |         |
| F                    | 20    | 20% | Total | F       | 73    | 11% | Total % |
| W                    | 57    | 56% | 28%   | W       | 260   | 39% | 57%     |
| Total                | 365   |     |       |         | 670   |     |         |

How do program/service area faculty and/or staff **review the processes** it uses to manage the curriculum and program, including the process of introducing new courses and/or workshops and services, the process of conducting quadrennial reviews for instruction, and the process of creating new programs and services?

We report curriculum issues/concerns/topics/new courses during every biology faculty meeting and with Santa Ana College faculty when the course is a shared course. Curriculum is collegially reviewed and approved quadrennially by both the SCC biology department, Santa Ana College and the SCC science cluster group. Quadrennials are split-up between every member of the department and hpreviously were handled through the curricUNET program. With the use of curricUNET, we have been able to more effectively communicate with other faculty in our science cluster and thus allow more access for faculty input in our program/course curriculum. We have recently migrated to eLumen but SAC remained on a version of curricUNET. We will have to evaluate this inference in the coming years. We also have been meeting with the Santa Ana biology faculty during Flex week to discuss issues of mutual important and to increase collaborative responses. With the introduction of the new C-ID course numbering system, we aligned our majors transfer curriculum as well as some of the biotechnology courses.

How do program/service area faculty and/or staff coordinate activities with other college programs and services, including the Library? How do program/service area faculty and/or staff maintain their knowledge of other programs and services offered at SCC? If applicable, what contact does the program/service area have with outside advisory groups?

Coordination exists between the department and Counseling, DSPS, the Testing Center, and the Tutoring Center (STAR center). Multiple faculty direct their students to the STAR center to complete interactive activities and worksheets (Directed Learning Activities or DLAs). The program has not coordinated with the Library apart from maintaining text copies and a skeleton bone box on reserve. The chairs of our department also discuss class times and section numbers with various other science department chairs to avoid course overlap and conflicts. We also receive updates from our SCC articulation officer with regards to departmental articulation issues and new CI-D offerings.

Our faculty also maintains coordination between the department and the Biotechnology community at large with meetings and discussions with the "Biotech Advisory Committee" that enables us to improve our course offerings and industry standards required for our new Biotechnology degree.

Upon consideration of the information you have presented in this section, what areas or issues will need attention from the program/service area in the next three years?

A. The program's curriculum and program currently meet students' needs except in the following areas: (which are all listed in our DPP)

- Offer more Microbiology courses when possible
- Expand and offer more sections of Bio 239 Anatomy, Bio 249 Physiology, Biology 211 Cellular & Molecular, Biology 221, Biology 231 (when possible)
- Expand our course offerings of our new Biotechnology Program when possible

B. The program will also continue to communicate with other programs and look for ways to use these relationships to further improve its effectiveness. This is especially true for the health science students who desire a path to earn the CNA degree that is compatible with their other studies.

C. The articulation officer (Leonor) has informed our department that CSUF has changed its curriculum and is not articulating as well with our biology program. We will need to address this as soon as possible.

## Resources

### Program Review Resources - Facilities Exclusive to Program/Service Area : Version by **Foley, Denise** on **12/11/2019 21:20**

Lecture Rooms: None.

Lab rooms: We use the following Lab rooms exclusively; SC-127, SC-129, SC-130, SC-132, SC-219 and U-85

Offices: SC-117, SC-118, SC-120, SC-122, SC-216, and SC-217.

Storerooms: SC-128, SC-131, SC-220 and U85.

Conference Rooms: None.

| Classrooms | Labs | Offices | Storerooms | Conference Rooms |
|------------|------|---------|------------|------------------|
| 0          | 6    | 3       | 11         | 0                |

### Program Review Resources - Facilities Shared with Other Programs/Service Areas : Version by **Foley, Denise** on **12/11/2019 21:20**

Lecture Rooms - SC-133, SC-205, SC-110, SC-111 SC-105, E-203, E-206

Offices: SC-117, SC-122, SC-214, and SC-217.

No Shared Storerooms.

Science Center Conference Room SC-210

| Classrooms | Labs | Offices | Storerooms | Conference Rooms |
|------------|------|---------|------------|------------------|
|------------|------|---------|------------|------------------|

| Classrooms | Labs | Offices | Storerooms | Conference Rooms |
|------------|------|---------|------------|------------------|
| 5          | 1    | 4       | 0          | 0                |

## Program Review Resources - Specialized Equipment and Resources : Version by **Foley, Denise** on **12/11/2019 21:20**

In addition to the equipment listed above, all biology laboratory rooms have sufficient quantities of various types of glassware, 32 light microscopes, 32 dissection microscopes and various models needed for the student's use. The prep-rooms each have a desktop computer and printer, analytical balances, glassware, hot plates, ice machines, refrigerators, a scientific dishwasher, utility carts, and chemicals. Each laboratory has at least 16 laptop computers for use in class. We also have a greenhouse and 2 autoclaves for use by the department.

The following has been broken or no longer usable, even though we have been submitting resources requests and IT replacements requests this equipment have not been replacement for the last 3-4 years now.

Lab Printers (3-ALL THAT WE HAVE)

Laptop computers (89-ALL ARE OVER 10 YEARS OLD AND CANNOT BE USED BY ANY CLASS)

| Equipment/Resource                                                              | Description                                                                                                                        |
|---------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|
| The Anatomy and Physiology Laboratory (SC-127) has the following equipment:     |                                                                                                                                    |
| Power Lab Software and Console                                                  | Used to run dry labs for physiology classes                                                                                        |
| A Variety of models                                                             | A selection of models representing sections of the human body, organs systems, or individual organs used for studying anatomy      |
| 8 Bone Boxes                                                                    | Boxes containing full sets of human bones used for the study of anatomy                                                            |
| Centrifuge                                                                      | Used for separating a mixture of molecules, materials, or cells in a liquid based on differences in weight using centrifugal force |
| Dissection Equipment                                                            | Trays and a variety of tools used in the dissection of various organ systems                                                       |
| 8 Tuning Forks                                                                  |                                                                                                                                    |
| 5 Articulated Skeletons                                                         | Used to teach students anatomy of the skeleton system                                                                              |
| 4 Real Skulls                                                                   | Used to teach students anatomy of the skull in greater detail                                                                      |
| 4 Audiometer                                                                    | Used to teach physiology students the functions of the inner ear                                                                   |
|                                                                                 |                                                                                                                                    |
| The Cell and Molecular Biology Laboratory (SC-130) has the following equipment: |                                                                                                                                    |
| 8 Thermofisher Spectronic 200 spectrophotometers                                | Spectrophotometer used to determine absorbance and transmittance of solutions                                                      |
| 8 Hanna Instruments pH meters                                                   | Equipment for measuring the acidity and alkalinity of a solution                                                                   |
| 8 MiniOne electrophoresis systems                                               | Used to run agarose gels for DNA analysis and separation of protein mixtures                                                       |
| 8 Sets of micropipettes (P20, P200, P1000)                                      | Used for accurately drawing and dispensing of microliter volumes of liquids                                                        |
| 4 Ohaus Dial-O-Gram triple beam balances (0.01g)                                | Used for accurate weighing of objects and substances                                                                               |
| 4 VWR electronic balances (0.1g)                                                | Used for general weighing of objects and substances                                                                                |
| VWR 16-tube high speed microcentrifuge                                          | Used for separating a mixture of molecules, materials, or cells in a liquid based on differences in weight using centrifugal force |
| 6-Tube mini centrifuge                                                          | Used for combining all of the liquid together inside a microcentrifuge tube at the bottom of the tube using centrifugal force      |
| Vortex mixers                                                                   | Equipment used to mix the contents in microcentrifuge tubes                                                                        |
| Bio-Rad T100 thermalcycler                                                      | Equipment used for amplification of DNA/RNA                                                                                        |
| 4 incubator/ovens                                                               | Used for growing cultures of microorganisms or drying wet samples/materials                                                        |
| 8 stirring hotplates                                                            | Used to warm/heat and/or mix solutions in lab glassware at a controlled temperature                                                |
| 3 water baths                                                                   | Used to warm/heat solutions in lab glassware at a controlled temperature                                                           |
|                                                                                 |                                                                                                                                    |
|                                                                                 |                                                                                                                                    |
| The Microbiology Laboratory (SC-219) has the following equipment:               |                                                                                                                                    |
| 2 Thermofisher UV-VIS spectrophotometers                                        | Spectrophotometer used to determine absorbance and transmittance of solutions in UV spectrum and Visual spectrum                   |
| Homogenizer                                                                     | Used to pulverize a sample of biological material in a liquid solvent and create a uniform mixture for analysis                    |
| 6 incubator/ovens                                                               | Used for growing cultures of microorganisms                                                                                        |
| VWR 16-tube high speed microcentrifuge                                          | Used for separating a mixture of molecules, materials, or cells in a liquid based on differences in weight using centrifugal force |
| Centrifuge                                                                      | Used for separating a mixture of molecules, materials, or cells in a liquid based on differences in weight using centrifugal force |
| 2 filtration machines                                                           | Equipment used for separating larger particulates from a liquid by forcing the liquid through a membrane with very small pores     |
| 2 autoclaves                                                                    | to sterilize media and waste                                                                                                       |

| Equipment/Resource                                                                             | Description                                                                                                                                       |
|------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| The Biotechnology Laboratory (U-85) has the following equipment:                               |                                                                                                                                                   |
| Seqstudio Genetic Analyzer                                                                     | DNA sequencer and Fragment Analyzer for mutation detection and organism identification                                                            |
| Biorad Chemidoc Touch imaging system                                                           | DNA/RNA/ Protein gel imager                                                                                                                       |
| T-100 BioRad thermalcycler                                                                     | Equipment used for amplification of DNA/RNA                                                                                                       |
| 8 MiniOne PCR systems                                                                          | Equipment used for amplification of DNA/RNA                                                                                                       |
| 16 MiniOne electrophoresis systems                                                             | Used to run agarose gels for DNA/RNA confirmation                                                                                                 |
| 6 Spectronic 20 spectrophotometers                                                             | Spectrophotometer used to determine absorbance and transmittance of solutions                                                                     |
| 6 Thermofisher UV-VIS spectrophotometers                                                       | Spectrophotometer used to determine absorbance and transmittance of solutions in UV spectrum and Visual spectrum                                  |
| Bio-Rad RT PCR system                                                                          | Equipment used for amplification and quantification of DNA/RNA                                                                                    |
| Nanodrop spectrophotometer                                                                     | Spectrophotometer used to determine absorbance and transmittance of very small volumes of solutions                                               |
| 6 Electronic analytical balances (0.001g)                                                      | Used for accurate weighing of very small amounts of a substance                                                                                   |
| 4 Ohaus electronic balances (0.01g)                                                            | Used for accurate weighing of objects and substances                                                                                              |
| 8 Ohaus Adventure Pro electronic balances (0.1g)                                               | Used for general weighing of objects and substances                                                                                               |
| 8 Ohaus Dial-O-Gram triple beam balances (0.01g)                                               | Used for accurate weighing of objects and substances                                                                                              |
| 8 Hanna Instruments pH meters                                                                  | Equipment for measuring the acidity and alkalinity of a solution                                                                                  |
| 8 Sets of Pipetman micropipettes (P10, P20, P200, P1000)                                       | Used for accurately drawing and dispensing of microliter volumes of liquids                                                                       |
| 16 Sets of MiniOne micropipettes (P20, P200, P1000)                                            | Used for accurately drawing and dispensing of microliter volumes of liquids                                                                       |
| 8 Sets of Vernier LabQuest 2 systems with CO2 sensors, O2 sensors, and Spectrophotometer units | Equipment used for measuring and monitoring levels of CO2, O2, and %transmittance and absorbance                                                  |
| Large Refrigerated swinging bucket centrifuge                                                  | Used for separating a mixture of temperature sensitive molecules and materials in a liquid based on differences in weight using centrifugal force |
| 4 6-tube mini centrifuges                                                                      | Used for combining all of the liquid together inside a microcentrifuge tube at the bottom of the tube using centrifugal force                     |
| 1 VWR 16-tube High Speed Microcentrifuge                                                       | Used for separating a mixture of molecules, materials, or cells in a liquid based on differences in weight using centrifugal force                |
| 2 Vortex Mixers                                                                                | Equipment used to mix the contents in microcentrifuge tubes                                                                                       |
| 1 UV PCR Prep Enclosure                                                                        | Used to provide a contaminant free space for preparing samples for DNA analysis                                                                   |
| 32 Electronic Pipette Controllers                                                              | Equipment for drawing and dispensing liquids from serological pipettes                                                                            |
| 8 Bio-Rad PAGE systems                                                                         | Equipment for vertically separating mixtures of proteins                                                                                          |
| 4 Bio-Rad PowerPac Electrophoresis Power Supplies                                              | Used to provide selectable high-voltage current for electrophoresis chambers                                                                      |
| Bio-Rad NGC Quest 10 Liquid Chromatography System                                              | Equipment used to separate mixtures of proteins and other biological compounds and to purify select components of those mixtures                  |
| Artel micropipette calibration system                                                          | Equipment for measuring accuracy of micropipettes and micropipetting technique                                                                    |
| Sartorius bioreactor                                                                           | Vessel with controlled temperature, pH, and CO2 gas levels for growing large amounts of cells                                                     |
| Keyence inverted fluorescent microscope                                                        | Microscope for visualizing fluorescing proteins and stained cell components in fixed or live cells                                                |
| Form 2 stereolithographic 3D printer                                                           | Equipment for additive manufacturing of fine 3-dimensional objects in resin cured in layers with ultraviolet light                                |
| Elga ultrapure water system                                                                    | Used to provide sterile and contaminant-free water for biotechnology procedures and solution preparation                                          |
| 2 Tissue Culture Hoods                                                                         | Equipment used to provide a contaminant free space for working with live cell cultures                                                            |
| CO2 Incubator                                                                                  | Equipment used for growing cells in environments that require a controlled limitation of oxygen                                                   |
| 1 Minus 20C Lab Freezer                                                                        | Used for long term storage/preservation of chemicals and cells                                                                                    |
| 2 incubator/ovens                                                                              | Used for growing cultures of microorganisms                                                                                                       |
| 2 water baths                                                                                  | Used to warm/heat solutions in lab glassware at a controlled temperature                                                                          |
| 1 metal bead temperature bath                                                                  | Used to warm/heat solutions in lab glassware at a controlled temperature where the presence of water needs to be avoided                          |
| Heatblock                                                                                      | Used to warm/heat solutions in microcentrifuge tubes at a controlled temperature                                                                  |
| 8 stirring hotplates                                                                           | Used to warm/heat and/or mix solutions in lab glassware at a controlled temperature                                                               |
| 8 propane bunsen burners                                                                       | Used to flame sterilize equipment and glass container openings when working with microorganisms                                                   |
| Autoclave                                                                                      | Equipment used to sterilize containers, tools, and solutions prior to use or for sterilizing biohazardous waste prior to disposal                 |

| Equipment/Resource          | Description                                                                                                                                                                               |
|-----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Biotechnology trailer       | Transport of all laboratory equipment, supplies, and chemicals for teaching our Introduction to Biotechnology Lab (Bio 190L) dual enrollment course at local partner high school campuses |
| Animal Diversity and Botany |                                                                                                                                                                                           |
| 4 Animal Specimen Cabinets  | Used to show students specimens of skins and birds                                                                                                                                        |
| 5 Insect Specimen Cabinets  | Used to show students insect morphology                                                                                                                                                   |
| Moss Growth Chambers        | Used to show students moss growth                                                                                                                                                         |

## Program Review Resources - Funding Sources : Version by **Foley, Denise** on 12/11/2019 21:20

The biotechnology program (within the biology department) was started in 2013. The buildout of the program was grant and special project funded. Equipment and supplies as well as personnel have been funded through grants, Perkins, and the Strong Workforce Program.

| Grant and \$                                                                                                                                 | Activities and Items Funded                                                                                                                                                                                                                                                                              |
|----------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Collaborative grant (2207 redirect from Perkins):<br>\$21,851.77<br>7/13-6/14                                                                | STEM counselor and lab assistant hours, Adjunct backfill- Intro to biotech and Biotech A. 1 lab release project director, curriculum development, conferences                                                                                                                                            |
| Collaborative Grant (2208): \$28,069.18<br>8/14-11/14                                                                                        | Instructional supplies, portion of lab release project director, portion adjunct backfill for Biotech A                                                                                                                                                                                                  |
| Perkins/CTEA (1850): \$109,720<br>7/1/14-6/30/15                                                                                             | Pay adjuncts for backfill- run biotech A, Biotech B, Intro to biotech (intersession) courses. Lab assistant hours, instructional supplies, reagents, and 69K equipment.                                                                                                                                  |
| Career pathways (2188): \$317,308<br>6/14/-6/18                                                                                              | Pay to run each of the biotech-specific courses 1x. internship coordination \$, 2 SI leaders yrs 2-4, learning facilitator yr 2-4, administrative assistant (CTE office), pathways days, STEM showcase, science night, and outreach, conferences, 10K instructional supplies, reagents and 20K equipment |
| CTE Enhancement Fund Program (40%) \$50,948<br>3/15-3/16                                                                                     | enhancement of Biotech B: Proteins<br>\$1,000 curriculum development, \$12,000 professional consultation, \$37,948 for equipment, instructional support, instructional supplies                                                                                                                          |
| CTE Enhancement Fund Program-Regional Collaborative Projects (60%) \$184,178<br>6/15-2/16                                                    | Tissue Culture Space equipment and instructional supplies totaling \$144,852, summer camp subsidizing for bridge to biotech program, instructional assistants, curriculum dev and conferences                                                                                                            |
| NSF collaboration (co-PI) with K. Takahashi at Santa Ana College (\$562, 496 total)<br>\$91,951 to SCC<br>7/2015-7/2018                      | Faculty Stipend, Student assistants 200 hours total, \$6,000 conference, \$50,721 equipment                                                                                                                                                                                                              |
| Perkins/CTEA: \$61,259<br>7/1/15-6/30/16                                                                                                     | Funding for high-tech (confocal-like) inverted fluorescence microscope. Keyence model preferred- no dark room required.                                                                                                                                                                                  |
| CTE Strong Workforce Regional Collaborative project-round 1 (2185) \$13,544<br>6/17-12/18                                                    | Stipends for High school faculty to develop curriculum and pacing guides for UCCI-approved HS course to pave way for articulation agreements, student assistants, instructional supplies                                                                                                                 |
| CTE Strong Workforce Regional Collaborative project-round 2<br>\$351,956.00 to SCC<br>7/18-12/19                                             | SCC took on the lead from IVC and received a total budget \$351,956.00. This funded numerous items including a laboratory of laptops, equipment items but the money also includes grant oversight and personnel funding for entire region by the BCE division office.                                    |
| ASCCC OER grant \$7,710<br>9/19-12/19                                                                                                        | publish open online lab book for biology 190L (intro to Biotech)                                                                                                                                                                                                                                         |
| CTE Strong Workforce Program Round 2 yr 2<br>\$367,569<br>7/19-12/20                                                                         | Funding regional personnel, outreach efforts, Instructional and student assistants, equipment and supplies                                                                                                                                                                                               |
|                                                                                                                                              | Total specifically to SCC Biotech = \$1,606,063                                                                                                                                                                                                                                                          |
| NSF- S-STEM grant co-PI Denise Foley with Nahla, El Said, Cindy Swift, Jennifer Coto- Jeff Wada PI (SCC Chemistry)<br>\$625,200<br>8/15-6/19 | Scholarships for underrepresented STEM students to alleviate unmet financial need for the purpose of increasing degree attainment and transfer                                                                                                                                                           |

| Funding Source | Description |
|----------------|-------------|
| undefined      | undefined   |

## Program Review Resources : Version by **Foley, Denise** on 12/11/2019 21:20

How well do the facilities used by the program/service area meet its needs? Do facilities and equipment meet appropriate safety criteria?

The Master Plan speaks of eliminating the U building village area but we have not seen a plan that would replace the lost instructional spaces, especially the specialized U85 room. U85 is integral to the biology department's offerings. The loss of this space without replacing it appropriately would be devastating to our program. The entire biotechnology program is taught from this space. There is no other space in the Science Center sufficient to house the needed equipment for this program, which has been a very large investment by the taxpayers. We also

spent significant time and dollars updating one side room into a clean space to teach cell culture methods. We cannot squander this investment by eliminating this space without an appropriate plan to house it elsewhere. Furthermore, scheduling the biotechnology laboratories would become very difficult if we lost this space and were forced to "make do" within the science center. The loss of U85 without relocation to another appropriate dedicated space would surely kill the program. It might be a slow painful type of death rather than a swift stroke of the pen, but we are certain loss of U85 without a solid relocation plan would kill it.

Currently biology labs in the SC building are in use throughout the day Monday-Friday. This lack of laboratory space limits the growth of courses in the department. The biology department as well as other departments quickly maximized the use of the science center laboratories. The center was built without growth in mind and we need more laboratory space if we are to expand our offerings.

Biology labs in the SC building have appropriate safety equipment such as safety showers, eyewashes, and chemical hoods, which are routinely inspected. Laboratory coordinators provide specialized containers for the proper storage and disposal of chemicals and/or preserved animal specimens.

How sufficient are the program/service area's equipment, supplies, and materials? Does the program/service area have a budget and timeline for the purchase of needed equipment and supplies?

The department recently received additional funding through resource requests that have allowed us to buy a wide variety of anatomy models and physiology equipment. However, consumable materials are still the biggest issue with biology labs. Limited funds for the department affects our ability to purchase slides, animals for dissection, chemical reagents and specialized consumable materials. More and more students are required to share supplies and materials, lessening their individual participation in lab activities.

Due to the availability of previous grants and current Strong Workforce Program monies, the biotechnology program has, thus far, been successful in obtaining funding to build out and support this program.

How well do technology resources (i.e., computers, software, media and presentation equipment) meet the needs of the program/service area?

COMPUTERS ARE OUTDATED IN ALL BUT 2 LABS -U85/biotechnology and SC219 microbiology purchased new laptops with SWP funding. All 4 other biology labs have outdated laptops. They were purchased with the science center building with no plan for replacement. Now they are no longer supported by IT. Windows cannot be upgraded and thus the laptops are completely useless. Our department shares the one set of laptops (for 32 students) in the science center, which is not ideal.

How well do technology resources (i.e., computers and software), training, and technical support meet the **administrative** needs of the program/service area?

There has not been adequate workshops and training on our new eLumen program as yet. The workshops offered so far were not convenient for many faculty in the department so they have not been trained on the curriculum, SLO, or Program Review. The departmental planning has not yet been offered to our knowledge. Because of the lack of training to all except the department chairs for program review, this cycle of program review has been the most difficult to date. However, technical support has been helpful.

How adequate is staff support (provided by administrative assistants, lab assistants, learning facilitators, and instructional assistants, and other classified staff) to meet the instructional and operational needs of the program/service area?

Our department has ongoing:

2 full time science coordinators

1 part time Instructional assistant

In addition, the Strong Workforce Program monies have recently allowed for the support of 2 part time Instructional Assistants and 3 part time student assistants to help with the running of the biotechnology-associated laboratories, including Microbiology and Cell and Molecular Biology. There is also a part time Career Coach assigned to the regional biotechnology program. This support can occur as long as funding is available through the Strong Workforce Program. Without this funding, our department will feel the effect of short staffing more prominently.

We have work for and need 2 -3 part time staff members to maintain and fulfill the requirements of this department. The SWP money has temporarily alleviated a small amount of the strain but it is not ideal. The staffing is very short term with high turnover.

We are the second largest department within SCC, generating the second most FTES and we need help to maintain the quality instruction and safety standards for our Lab courses. We have been requesting ongoing help to address this need this for the past 5 years but the funding for the positions have not been granted. The shortage of help to run the numerous lab sections in our department is now starting to effect our capabilities, causing us to lower the number of course sections, effecting the retention and transferability of our students.

Does your program/service area receive any categorical (Basic Skills, Student Equity, SSSP, Strong Workforce Program) and/or grant funding? If so, what major activities or resources has the funding allowed for? What impact has this had on your program/service area (address both positive *and* negative impacts)? If the college were to sustain these activities, which are critical to your program/service area and what would be required to institutionalize them?

The biotechnology program is currently supported in large part with Strong Workforce Program (SWP) funding. This funding supports regional biotechnology efforts such as a job and internship coordinator and biotechnology career education coach but, in addition, has funded supplies, equipment, student and instructional assistants for the program. The Biology department as a whole has benefitted since courses such as Cellular and Molecular Biology (Bio 211) and General Microbiology (Bio 229), which are part of the biotechnology degree and certificate options have benefitted. Thus, our biology majors and the health science students also benefit from these updates and support. The updated equipment include new spectrophotometers, pH meters, some laboratory laptops, micropipettors, a petri plate pouring robot, DNA sequencer and more. Student and instructional assistants help our instructors and science coordinators with the tasks of running the laboratory courses. Additionally, because the biotechnology program is self-sufficient due to these funds, the resource requests from our department are more limited than they otherwise would be. This is a relief since the resource request process rarely results in the needed funding to accomplish what we are attempting. Furthermore, since the SWP program can fund student and instructional assistants, the microbiology course has not needed to request the hiring of a contractually allowed instructional assistant for the large lecture for the General Microbiology course for several semesters which frees the general fund monies that otherwise would be allocated for that purpose. Finally, the SWP program had monies to pay for the autoclave service contract this 2019-2020 term, again freeing over \$12,000 of general fund monies that is typically allocated for this purpose.

The funding has only positive impacts. The activities are already sustained by the college. Without the SWP funding, the college would once again need to fund the instructional assistants for large lecture in the microbiology and the cellular and molecular biology courses, be considering further resource requests from the department, and our instructors would likely need to reduce some teaching exercises in the laboratories unless a larger department budget for supplies to run the laboratories was granted.

Title V began the funding for the STAR CENTER and SI. We know that the STAR Center has outgrown its space and SI sections are being reduced due to funding cuts and has not been institutionalized as promised in the Title V grant. Despite data showing improvement of student success SI is being cut. This is in direct opposition to the mission of the college and the tenets of Guided Pathways and the Vision for Success which support efforts for student completion.

Evidence:

In spring 2016, the department was able to provide SI leaders for 9 different sections for Bio 211, 221, 229, 239 and 249 (we could have hired several more). Due to a cut in funding, we are only allowed to hire for 6 sections this semester. As of Spring 2019, there are no SI leaders for 221 and 231, and not all 229, 239 and 249 sections are covered. Attendance to 239 and 249 SI sessions are especially high, where it is not uncommon to have 40 students at a single SI session. Consistent funding for SI sessions should be institutionalized to ensure that we can offer this vital service for our students.

Supplemental Instruction (SI) Attendance and Grade Distribution. Groups are divided into students that participated in SI and those that did not. Students that regularly attend SI sessions

have a higher percentage of passing grades than those that do not.

### Spring 2019

All Classes Combined

| Grade | Part. | %   | Grade   | Did Not Part. | % | Total %     |
|-------|-------|-----|---------|---------------|---|-------------|
| A     | 82    | 22% | A       | 80            |   | 12%         |
| B     | 96    | 26% | Total B | 110           |   | 16% Total % |
| C     | 86    | 24% | 72% C   | 99            |   | 15% 43%     |
| D     | 24    | 24% | D       | 48            |   | 13%         |
| F     | 20    | 20% | Total F | 73            |   | 11% Total % |
| W     | 57    | 56% | 28% W   | 260           |   | 39% 57%     |
| Total | 365   |     |         | 670           |   |             |

### Fall 2018

All Classes Combined

| Grade | Part. | %   | Grade   | Did Not Part. | % | Total %     |
|-------|-------|-----|---------|---------------|---|-------------|
| A     | 125   | 23% | A       | 214           |   | 16%         |
| B     | 138   | 25% | Total B | 229           |   | 17% Total % |
| C     | 110   | 20% | 68% C   | 204           |   | 15% 48%     |
| D     | 48    | 27% | D       | 105           |   | 15%         |
| F     | 38    | 22% | Total F | 144           |   | 11% Total % |
| W     | 90    | 51% | 32% W   | 454           |   | 34% 52%     |
| Total | 549   |     |         | 1350          |   |             |

### Spring 2018

All Classes Combined

| Grade | Part | %   | Grade   | Did Not Part. | % | Total %     |
|-------|------|-----|---------|---------------|---|-------------|
| A     | 89   | 22% | A       | 82            |   | 11%         |
| B     | 112  | 28% | Total B | 121           |   | 16% Total % |
| C     | 100  | 25% | 76% C   | 136           |   | 18% 46%     |
| D     | 30   | 31% | D       | 72            |   | 18%         |
| F     | 21   | 22% | Total F | 84            |   | 11% Total % |
| W     | 46   | 47% | 24% W   | 250           |   | 34% 54%     |
| Total | 398  |     |         | 745           |   |             |

### Fall 2017

All Classes Combined

| Grade | Part | %   | Grade   | Did Not Part. | % | Total %   |
|-------|------|-----|---------|---------------|---|-----------|
| A     | 116  | 24% | A       | 85            |   | 8%        |
| B     | 130  | 27% | Total B | 158           |   | 14% Total |
| C     | 97   | 20% | 70% C   | 172           |   | 16% 38%   |
| D     | 31   | 6%  | D       | 90            |   | 8%        |
| F     | 47   | 10% | Total F | 191           |   | 17% Total |
| W     | 69   | 14% | 30% W   | 407           |   | 37% 62%   |
| Total | 490  |     | Total   | 1103          |   |           |

Upon consideration of the information you have presented in this section, what areas or issues will need attention from the program/service area in the next three years?

We need the following:

Updated laptops

2 part time ongoing staff

3 new printers

New Lab facilities

Funding for more SI sections

Increased capacity STAR center

An increase in our department lab budget

1 new faculty (Micro/biotech) member

## Human Resources

### Program Review Human Resources - Support Staff : Version by **Foley, Denise** on **12/11/2019 21:20**

With the increased course offerings, we still need 2 ON GOING part time staff members to assist with the volume of lab sections offered, The SWP funds short term IAs to assist with the biotechnology program, including the off-site dual enrollment lab course. There is a need during the semesters and summer so the limitations on short term IAs is very contraining. General funds support large group lectures with contractually allowed allotted hours of assistance but we need additional laboratory support to assist the laboratory coordinators.

| Title of Position                                                      | Count | Full-time or Part-time | Months per Year | Funding Source |
|------------------------------------------------------------------------|-------|------------------------|-----------------|----------------|
| Science coordinator                                                    | 2     | Full time              | 12              | general funds  |
| Instructional Assistants (Biology large lecture contractually allowed) | 3-4   | part time              | 10              | general funds  |

| Title of Position                           | Count | Full-time or Part-time | Months per Year | Funding Source           |
|---------------------------------------------|-------|------------------------|-----------------|--------------------------|
| Instructional Assistants<br>(Biotechnology) | 2.5   | part time              | 11              | Strong Workforce Program |
| Student Assistants                          | 3-4   | part time              | 10              | Strong Workforce Program |
| Biotech Career Education Coach              | 1     | part time              | 12              | Strong Workforce Program |
| Instructional Assistant biology labs        | 1     | part time              | 10              | general funds            |

## Program Review Human Resources : Version by **Foley, Denise** on 12/11/2019 21:20

What are faculty, staff, and administrators doing to remain current in knowledge of learning theory, counseling and student development theory, maintenance and operations practices, instructional strategies, and content? In which professional organizations and conferences do faculty, staff, and administrators participate?

**Denise Foley**– Denise is an active member of the biology department by attending number of conferences and workshops including weeklong workshops on CRISPR/Cas9 and cell culture (2018), workshops on teaching biotech-related topics, and the Bio-Link conference (2018). She also helped author a UCCI approved biotechnology course entitled "The Science and Ethics of Biotechnology". In addition, she has also taken an online course in order to sit for the Certification for Quality Improvement Association examination which allows her to teach her students common quality techniques. Lastly, she has been an Equity Core member where she helps train others and she is a Guided Pathways Faculty Lead. She also stays current in his field by reading journals and periodicals and attending webinars.

**Anson Lui**– Anson is an active member of the biology department by attending the Biotechnology Advisory Committee meeting (2016, 2017, 2018), Statewide Biotechnology Faculty Retreat (Oceanside, CA 2019), Thermofischer teaching lab (Carlsbad, 2019), actively developing introductory biology lab manual (BIO109L) as well as introductory biotechnology lab manual (BIO190L), getting trained on use of the DNA sequencer, and reads primary literature on topics of cellular Biology and molecular genetics.

**Sandra Sanchez**- Attends to the Project Kaleidoscope to transform undergraduate STEM education every year is a member of the Association of American Colleges & Universities (AAC&U), She is also a Textbook reviewer and Textbook Co-Author. She stays current in her field by reading journals, books, and periodicals in the fields of human physiology.

**Kimberly Johnson**- Attends the Active Learning Leaders conference at Palomar College every year. This conference focuses on teaching methodologies and pedagogies. Professor Johnson stays current in the field by attending annual conferences focusing on current science research. One of largest conferences she recently attended was that for the Society of Integrative and Comparative Biology. This conference included helpful teaching workshops along with current research on animal physiology the instructor incorporated into the classroom.

**Mark Smith** - Participates in national conferences (NABT, etc) and workshops, (C-ID, Textbook workshops, Instructional learning workshops, SLO workshops) is a member of AAAS (American association for the advancement of science) NABT, and FIRST (Faculty Institute for the Reform of Science Teaching). He is also a Textbook reviewer and Textbook Author. He stays current in his field by reading journals, books, and periodicals.

**Mike Taylor**- Volunteers in field projects primarily those dealing birds and includes students on the surveys. He incorporates current national field studies into his classes, and takes university classes in the biological sciences and in education. He is a member of the Audubon Society and participates in activities with the local chapter. He stays current in his field by reading journals, books, and periodicals.

**Navanot Batth**- Is a member of the American Society for Clinical Pathology which allows him to stay current in clinical lab techniques and diagnostics which he then teaches to students. In addition he has attended the Biotechnology Retreat (2017, 2018) and the Statewide Biotechnology Retreat (Carlsbad, CA 2019). In addition, he has incorporated some of the latest technology in DNA sequencing for the biotechnology labs including a DNA sequencer. He stays current in his field by reading journals, books, and periodicals.

How do faculty, staff, and administrators participate in college-wide programs, shared governance bodies, and leadership activities? In what ways do faculty, staff, and administrators serve as resources for the community?

Almost every faculty member within this department actively participates in college service.

Every member has been highly involved with Science night.

Mike Taylor is VP of Senate

Sandra Sanchez is the Science curriculum rep.

Kim Johnson is SI leader coordinator and on academic senate

Denise Foley is faculty facilitator for Guided Pathways, is an equity core team member and coordinates biotech funding and program.

Anson Lui is in charge of Biotech and Biotechnology Outreach and Recruitment. He is the current dual enrollment instructor for Bio190/190L at El Modena and until this year had served in the Community Science night committee for his entire SCC career

Novy Batth is only in his second year and wants to be involved in Biotech Outreach and Recruitment

Mark Smith is science rep on senate and VP of FARSCCD.

Are adequate numbers of qualified faculty, staff, and administrators available to teach and/or implement all components within a program/service area's offerings or services?

No.

We have a shortage of staff and faculty.

As stated before, we need 2 part time staff members, 1 fulltime faculty member and 3-4 adjunct faculty to fully meet the demands of our program. Due to the nature of biology it is always difficult to find qualified adjunct faculty for our courses.

The school's addition of STEM courses have already put pressure on our staff to work harder and use less money per lab. Furthermore, we anticipate a greater need when the biotechnology program comes fully online on an annual basis, especially when no longer supported fully by alternate funding such as SWP. We anticipate the need to have more laboratory staff in the near future if we are to offer these new lab courses. Without more help, we will not be able to offer the courses.

Microbiology and biotechnology has Instructional assistants and student assistants that are funded by Strong Workforce program. Should this funding go away, we will require more assistance funded by other sources.

Are adequate and appropriate mentoring and professional development opportunities available and do department faculty, staff, and administrators regularly utilize these opportunities?

Before the semester begins and during the semester, the members of this department attend various faculty development workshops offered by the College. The majority of the content of the workshops focus on technology, student learning outcomes, and their assessment; however, there are few activities in which the material is on academic, administrative, and student service issues.

The faculty could benefit from the opportunities to attend other learning workshops and conferences offered during the semester in the fields of biology or education. However, the district has denied reimbursement for these various faculty developmental activities, and as a result, the faculty faces limited enrollment opportunities and access to other learning activities.

To what extent are adjunct faculty, part-time staff, and interim administrators knowledgeable about the program/service area's practices and standards? What opportunities are provided for adjunct faculty, part-time staff, and interim administrators to become engaged in program/service area activities and communication?

Every semester FLEX week meetings are planned and attended by the adjunct faculty. They also are welcome to attend any other meeting, workshop, activity that the department holds.

WE have several adjuncts who actively participate and all of them have attended Science Night every year. Whenever we send out emails detailing issues or concerns of the department,

the adjunct faculty are always included.

In addition, a handout developed by Mark Smith documenting the specific standards and policies of the Biology Department is given to each adjunct faculty member for further clarification. Department chairs are in frequent communication with the adjunct regarding program practices, standards, and scheduling. Course syllabi, notes, and other materials provided by full time faculty are made available to adjunct as guides for their respective classes.

Upon consideration of the information you have presented in this section, what areas or issues will need attention from the program/service area in the next three years? Other than the SWP funded conferences for biotech faculty, we have a shortage of workshop and conference support. Our fulltime faculty don't have the money to attend conferences or workshops and the faculty developmental fund is non existant. The school has had very limited conferences or workshops reimbursement opportunities for faculty in the last 10 years.

We also have a shortage of staff and faculty.

As stated before, we need 2 parttime staffers, 1 fulltime faculty member and 3-4 adjunct faculty.

The school's addition of STEM courses have already put pressure on our staff to work harder and use less money per lab. We anticipate the need to have more laboratory staff in the near future if we are to offer these new lab courses. Without more help, we will not be able to offer the courses.

## Internal and External Communication

### Program Review Internal & External Communication : Version by **Foley, Denise** on **12/11/2019 21:20**

When were the program/service area's catalog entries last updated to ensure currency and accuracy?

They are reviewed and updated every year, right before printing.

When was the program/service area's Annual Plan (formerly called DPP) last updated to ensure currency and accuracy?

Our Annual Plan (DPP) is updated at the beginning of each academic year with input from all the department. Our last update was the beginning of the 2019-2020 academic year.

How does the program/service area keep its website comprehensive and current? Does the website contain the program/service area's mission? Does the website contain current contact information (telephone numbers, email addresses, and office hours and locations) for program/service area faculty and/or staff? Are program/service area outcomes posted? Are outcome assessment results posted?

Anson Lui is continuing with the task of maintaining the biology department's website. Two new pages have been created for the Biotechnology certificate program and related resources. One of the two pages provides more specific details about our program structure and course offerings while the second page is designed to be more of a showcase and advertisement for the Biotechnology program. A vanity URL has also been created to facilitate directing students and the public towards our new program pages. All content on the department website is reviewed each semester and is updated as needed including the department homepage, faculty and staff contact information, existing and new course descriptions, and SLOs. All course SLO's are listed but not the outcome assessments. A link to the Department's SLO assessment results will be added. He will continue to add to the website when there is new information. The department's mission is located at the bottom of the Biology's home page.

How does the program/service area keep instructional faculty, counselors, advisors, and/or service area personnel informed about course offerings, trainings, workshops, and related practices?

Direct communication between appropriate student service personnel and Biology faculty through email, meetings and phone discussions ensures that these personnel are fully informed about our program courses and their sequences. We will continue to communicate with appropriate student service personnel to keep them apprised about the program. Denise Foley and Kim Johnson attends the monthly STEM advisory meetings and communicates biology issues with the STEM counselors and others in attendance. The co-chairs of the biology department are always available for counselors to contact them with specific questions.

We also attend and participate in the following activities: Family Night, Student Bootcamp, Honors, STEM workshops, and other outreach activities of SCC.

How well do faculty and staff communicate about and coordinate the work of the program/service area?

We have divided up the work between all fulltime faculty members. Every year (Fall) we discuss and formalize the division of labor between the memebrs. The Co-Chairs then make sure the work gets done on time.

Upon consideration of the information you have presented in this section, what areas or issues will need attention from the program/service area in the next three years?

The biology department has always worked together to develop and implement the needs of the department. We work very well together, are open or other ideas and concerns. The Co-Chairs work directly with the Lab Coordinators to ensure transparency and cooperation within the department. We will continue to meet at least during FLEX weeks and subgroups may meet during the semester.

## Planning Agenda

### Program Review Planning Agenda : Version by **Foley, Denise** on **12/11/2019 21:20**

| Actions for 2019-2022                                                                                             | Supporting Data                                                                                           | Resources Needed                                                                    | Estimated Cost                                                                                  |
|-------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|
| teach laboratories using updated software                                                                         |                                                                                                           | sufficient laptops for the laboratories                                             | undefined                                                                                       |
| Offer Supplemental Instruction in challenging courses                                                             | see SI data in section.....                                                                               | SI funding                                                                          | \$12.75/hr x 10 hr/week/36 hour/ yr x _____<br>how many SI leaders do we need?                  |
| increase dual enrollment opportunities in biotech                                                                 | lower than hoped enrollment                                                                               | funding for adjuncts                                                                | \$_____ per adjunct per semester                                                                |
| investigate certified nursing assistant certificate integration into a health science student A.S. degree pathway | see Health Science Student responses in questionnaire                                                     | faculty and staff time, additional research, curriculum development                 | Unknown. May be minimal as both CNA program and health science courses exist on campus already. |
| Hiring of Staff                                                                                                   | An increase in our course sections dictate the need for increased staff help.                             | 2 parttime staff and 1 fulltime coordinator.                                        | Unknown                                                                                         |
| A budget for faculty development                                                                                  | To increase our retention and success, we need to attend conferences and workshops on improving teaching. | Faculty developmental funds                                                         | Unknown                                                                                         |
| Technology replacements                                                                                           | They don't function anymore.                                                                              | We need to replace 3 classroom printers                                             | 1500.00                                                                                         |
| Classroom Laptops                                                                                                 | They don't function anymore, they are over 10 years old.                                                  | We need about 80 laptops to complete curriculum based learning in the lab settings. | Unknown                                                                                         |
| Lab facilities                                                                                                    | An increase in our course sections dictate the need for more Lab rooms                                    | More Lab rooms                                                                      | Unknown                                                                                         |

## Summary Report

### Program Review Summary Report - What is and is not working : Version by **Foley, Denise** on **12/11/2019 21:20**

Briefly describe and explain what is working well in your program/service area.

The Biology faculty work exceptionally well together. We are able to divide department tasks and each take a lead role for specific courses offered. We meet regularly during the academic year (at least twice as a whole) and work efficiently to maintain high standards, and are continually reviewing existing department goals and writing new goals in response to college and department needs. We consistently complete our SLO reports on time.

*The biology department's efficiency rate is 43.5 is much higher than the school's rate of 35.8, especially for an 'expensive' science lab program.*

The Biology department is currently expanding; we have expanded our course offerings and our program with 5 additional certificates/degrees. The biology department (Denise Foley and others) have also written curriculum and received grants for the development of our new Biotechnology program. We hopefully will continue to add more course sections in response to the needs of our students. We strive to allow the students to fulfill the requirements of certificate and degrees such that they can complete their academic goals in a timely manner. For specific courses, such as anatomy, our waitlist numbers have remained consistently high throughout the years.

Briefly describe and explain what is not working well or needs attention in your program/service area.

Our departmental equipment, supplies and materials budgets need to be reinstated and/or increased due to the following issues:

1. We have a need to have funding available to repair or replace existing broken equipment to maintain the academic standards of the biology department. As you can see from our inventory above, we have numerous items to maintain.
2. We have Laboratory coordinator/assistants staffing issues - we need ongoing part time staff to help run the laboratories. Short term IAs have schedule limitations during the year that make it especially difficult.
3. We need outdated laptop computer replacements in all laboratories
4. We need more laboratory rooms to offer more sections of impacted courses such as Anatomy. We cannot afford to lose U85 if those buildings are removed
5. We will need additional monies to purchase new equipment to keep our curriculum updated, especially as we re-write biology 109L curriculum
6. We need to ensure that the institutionalization of SI and STAR is implemented and that there is room for expansion of those services, not reduction

Other Issues that need attention:

1. *The biology retention rate is slightly lower than the overall college. Anatomy is exhibiting especially lower rates of retention.* We need to continue to explore ways to improve student success.
2. The department as a whole should examine the success and retention of impacted groups and implement some practices shown to improve their success.
3. Supplemental Instruction has been cut do to lack of available funding despite data illustrating its effectiveness in improving student success and retention
4. Health Science students need a certificate and/or degree option that includes the CNA license preparation
5. Articulation agreements need to be updated and completed for schools of greatest interest to our students (UCI, CSUF, CSULB, UCSD, UCLA)
6. We should implement project based learning into our laboratory curriculum.

### Program Review Summary Report - Resources : Version by **Foley, Denise** on **12/11/2019 21:20**

| Facilities          | Technology          | Equipment           | Personnel           |
|---------------------|---------------------|---------------------|---------------------|
| see planning agenda | see planning agenda | see planning agenda | see planning agenda |

### Program Review Summary Report - Initiatives and Other Findings : Version by **Foley, Denise** on **12/11/2019 21:20**

What campus-wide initiatives intersect with your program's activities, operations and/or plans? (Please provide a hyperlink and a list of initiatives)

The Guided Pathways Initiative impacts our departmental activities. For example, our department is already moving forward with elements of Guided Pathways such as program mapping. We have worked with Phil Crabill in counseling to develop a generic 2 and 3 year plan for the AD-T in biology and a 2 year plan for the biotechnology A.S. degrees. In addition, last semester we surveyed our students (majors, health science, biotechnology) separately in order to capture their voice and hear their concerns. We are beginning to act on some of these such as investigating a new certificate and or degree in Health Science that weaves the CNA certification into it. The biology department will continue on this Guided Pathway journey with the campus as willing participants.

The campus equity plan is addressing the disproportional impact of specific groups on campus and our department is interested in how to address this concern. The department has also begun to look more closely at the data for impacted groups. We will begin to discuss practices that might help narrow the achievement gap of these groups and encourage faculty, including adjuncts, to implement the relevant best practices.

Summarize any other findings from your program/service area review and planning process that you would like to share with the college community.

[Biology Program Review Summary:](#)

The biology department strives to serve its students well. All of our goals, strategies, and implemented plans are made to improve student success and retention: Not only our biology major students, but all students of SCC that we impact.

We are the second largest department within SCC, generating the second most FTES and we need help to maintain the quality instruction and safety standards for our Lab courses. We have been requesting ongoing help to address this need this for the past 5 years but the funding for the positions have not been granted. The shortage of help to run the numerous lab sections in our department is now starting to affect our capabilities, causing us to not add or lower the number of course sections. This in turn affects the retention of our students who turn elsewhere to meet their academic needs and also affects the timeline of transferability of our students.

The Biology Department, even though it is considered an 'expensive science department', is consistently more efficient (43%) than the campus (35%) as a whole. We try to support the efforts of efficiency by offering several sections of double lectures (or triple lectures) linked to laboratories as well as large lectures for Biology 109. We frequently fill laboratories to room capacity. In addition, significant funding has been obtained over the years to build and support biotechnology which has benefitted the college as a whole. We, as a department, would appreciate being acknowledged in this area and be given some leeway, at times, to offer lower enrolled sections.

SCC (not apprenticeship) success (71%) and retention (83%) values are overall just a bit higher than our department's (success 70%, retention 81%) each year although we consistently exceed the standard of 63%.

We have an assessment cycle such that each course SLO is assessed at least once in a 3 year cycle. We have accessed every SLO in every biology course offered within the College's timelines.

The Biology department program offers the appropriate courses to meet the academic needs of the non-Biology (GE) students, the Biology major students, the Allied Health students, and the biotechnology students. The Biology department utilizes a variety of learning aids including verbal, visual, mathematical, and hands-on experiences in the classroom to help develop and advance the knowledge of students. In order to further our student's education experience, we offer various learning opportunities outside of the classroom such as; SI (peer-led group study sessions), Star Center tutoring, guest speakers, STEM summer research opportunities, biotechnology internships, and various field trips.

However, we need to explore the following areas in the future:

- Offer more Microbiology courses, when possible
- Expand and offer more sections of Bio 239 Anatomy, Bio 249 Physiology, Biology 211 Cellular & Molecular, Biology 221, Biology 231 (when possible)
- Expand our course offerings of our new Biotechnology Program, when possible
- Develop a Health Science degree with certificates for the Allied Health students
- Rewrite our Biology 109 lab manual with new updated lab exercises that are based in new STEM teaching techniques
- Continue to work on our articulation agreements with the UC's and CSU

The biotechnology program (within the biology department) was started in 2013. The buildout of the program was grant and special project funded. Equipment and supplies as well as personnel have been funded through 8 different grants, Perkins, Career Pathways Trust, and the Strong Workforce Programs.

Even though the biotechnology program has been able to receive funding, the overall biology department is still in need of additional funding for the following issues:

- Lab Printers (3-ALL THAT WE HAVE)
- Laptop computers (4 labs/80 units-ALL ARE OVER 10 YEARS OLD AND CANNOT BE USED ANY LONGER)
- 2 part time ongoing staff
- New Lab rooms facilities
- Funding for more SI sections
- Increased capacity STAR center
- An increase in our department lab budget
- 1 new fulltime faculty (Micro/biotech) member