



El Camino College
Compton Center

Life Science Program Review

2012-2016

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1. OVERVIEW OF THE PROGRAM

a) Narrative Description

The Life Science program is designed to prepare students interested in progressing to the paramedical/ pre-professional programs such as nursing and allied health careers, and/or those interested in transferring to four year colleges. Our program goal is to develop the students' understanding of biological principles, structure and function of living organisms, and the interactions/relationships with the physical aspects of the environment. The scope of the program includes the fields of anatomy, biology, microbiology, and physiology.

The Mission of the Life Science Program is to offer quality educational opportunities for students by providing courses that transfer to four-year institutions, offer associate degrees, and certificate courses that meet general education requirements. Maintaining optimal academic standards, ensuring availability of academic & student support services, providing facilities to support teaching and learning, and supporting professional development for faculty are vital to our mission.

The Life Science program fulfills three educational roles for students:

1. providing general education options for non-majors,
2. offering lower division courses for life science majors, and
3. preparing students for entry into various health-related fields and programs.

b) Degrees/Certificates Offered

The program offers courses that satisfy the General Education requirements for students to obtain either an Associate of Arts (A.A.) degree or an Associate in Science (A.S.) degree. Many of the Life Sciences courses fulfill the requirement of transfer institutions including California State University (CSU) and the University of California (UC) systems for a science course with a laboratory component. Additionally, many of the courses in the Life Sciences program satisfy prerequisite course requirements for students who will transfer and major in biology, botany, zoology, microbiology, molecular biology, anatomy, physiology, nursing, allied health, pre-dentistry, pre-veterinary, or pre-medicine. Students in the Life Science program may graduate with an A.S. or AS-T degree.

c) Alignment with Mission Statement and Strategic Initiatives

The program is aligned with the ECC Mission statement and the 2015-2020 Strategic Initiatives. Our program offers quality educational programs tailored to our diverse student community. The Life Science faculty have developed and utilized various assessment tools to monitor stated Student Learning Outcomes (SLO). The faculty members ~~we~~ have been trained to enter the data in "TracDat," a college-wide online repository of SLO results (Strategic Initiative A: Student Learning; Strategic Initiative E: Institutional Effectiveness). We have strengthened our student success efforts by adding Supplemental instruction and collaborating with the Learning Resource Center to track Learning Outcomes for students that participate in additional instruction (Strategic Initiative B: Student Success & Support).

We have new media projectors and whiteboards installed in all classrooms and we utilize the newly installed campus-wide Wi-Fi network for instruction and class activities (Strategic Initiative F: Modernization). Our Faculty actively develops relationships with high schools, colleges, business, and community-based organizations to help collaborate on ways to improve Learning Outcomes (Strategic Initiative D: Community Responsiveness). The faculty and students of the Life Science program are involved in campus-wide social programs such as celebrating different cultural and historical activities (Strategic Initiative C: Collaboration). These include Martin Luther King Day, Cesar Chavez Day, Cinco de Mayo, Black History Month observance, cultural exhibits, and musical presentations.

d) Status of Previous Recommendations

One of the main objectives of previous program reviews that is evident from the last three years' program plans is to "stay current with developments in the field of Biology." This focused on adding additional courses and expanding some currently offered courses because of increased demand from the community. Purchasing new equipment related to current trends in biology and microbiology was also a priority.

Since the previous Program Review we have been able to acquire additional laboratory materials and supplies in the past two years. We also added a new course in Biology. We have upgraded the Program in regards to new laboratory equipment including but not limited to new microscopes for the microbiology lab and three state of the art digital spectrometers for the biology lab.

The growing trend in workforce development toward the molecular study of biology and biotechnology necessitates a commitment by the division to invest in the type of equipment and technology that is needed to offer courses in this area of Biology. Concepts related to gel electrophoresis, DNA extraction and restriction mapping, polymerase chain reaction, and genetic recombination techniques could be introduced to produce graduates with knowledge in molecular biology and biotechnology.

e) Highlights and Future Vision

One of the highlights of the Life Sciences Program was that we sponsored a successful community-based Student Research Symposium in the spring of 2014 to showcase the microbiology research of the students on our campus. Student-led research is a proven high impact educational practice that allows students to receive close mentorship from a professor while implementing the scientific method and developing critical thinking skills. This type of research experience is highly beneficial to our students. Therefore, we have continued to hold this event every spring and intend to continue it in the future. Another highlight was hosting a Summer Science Academy in 2016 for local middle and high school students to come to campus and perform science experiments with our Instructors. Our program intends to make the Summer Science Academy an annual event to hopefully recruit those students to our college and sustain their interest in the Natural Sciences.

2. ANALYSIS OF RESEARCH DATA OF THE PROGRAM

This section contains the analysis of data provided by Institutional Research ECC Compton Center from Fall 2011 to Spring 2015.

a) Head Count of Students in the Life Science Program

The head count indicates a slight decline of students in all life science courses in 2013-2014 because fewer sections of each course were offered due to cuts in state funding to community colleges.

Anatomy Headcount

Term Headcount (Unduplicated Students)	Fall Term – Anatomy Students				All Compton Students
	2011	2012	2013	2014	Fall 2014
	408	387	392	472	7,701

Term Headcount (Unduplicated Students)	Spring Term – Anatomy Students				All Compton Students
	2012	2013	2014	2015	Spring 2015
	435	389	420	431	6,944

The number of students in Anatomy were high in 2011 and 2014 due to more sections offered. Section fill rates were at 100% or above. The head count of students in Anatomy varies from 387 to 472 students.

Biology Headcount

Term Headcount (Unduplicated Students)	Fall Term – Biology Students				All Compton Students
	2012	2013	2014	2015	Fall 2014
	168	160	182	197	7,701

Term Headcount (Unduplicated Students)	Spring Term – Biology Students				All Compton Students
	2012	2013	2014	2015	Spring 2015
	156	165	137	139	6,944

The head count varies from 137 students (Spring 2014) to 197 students (Fall 2015) in Biology courses. Generally, the headcounts were lower during the spring semesters than the fall semesters in accordance with the campus wide trend of lower enrollment in the Spring.

Microbiology Headcount

Term Headcount (Unduplicated Students)	Fall Term – Microbiology Students				All Compton Students
	2012	2013	2014	2015	Fall 2014
	142	128	129	138	7,701

Term Headcount (Unduplicated Students)	Spring Term – Microbiology Students				All Compton Students
	2012	2013	2014	2015	Spring 2015
	142	132	128	104	6,944

The head count of students varies between 142 students (Fall and Spring 2012) to 104 students (Spring 2015). The number of students in Microbiology during the Fall terms is fairly constant between 2012-2015, but there was a decline in number of students during the Spring terms from 2012 to 2015. The decline of students in Spring 2015 may be due to ~~from~~ more Microbiology courses being offered by other local colleges. The number of sections offered by the Life Science program remained constant at 10 from 2012-14 but increased to 11 in 2015.

Physiology Headcount

Term Headcount (Unduplicated Students)	Fall Term – Physiology Students				All Compton Students
	2012	2013	2014	2015	Fall 2014
	154	152	172	146	7,701

Term Headcount (Unduplicated Students)	Spring Term – Physiology Students				All Compton Students
	2012	2013	2014	2015	Spring 2015
	154	145	133	151	6,944

The headcount in Physiology is fairly constant around 150 students in both Fall and Spring terms. The number decreased from Spring 2012 to 2014 before picking up in 2015 while the Fall numbers dropped in 2015.

Head count in Life Science Program

The total number of students in the Life Science program in Fall terms declined to 827 in 2012 from 872 in 2011. It then gradually increased in 2013 and 2014. The headcount also decreased during the Spring terms from 887 students in 2012 to 818 in 2014 but then slightly increased to 825 students during the Spring 2015 term.

Fall					Compton Student Population
Term					
	2011	2012	2013	2014	Fall 2014
Term Headcount	872	827	875	953	7,701
Spring					Compton Student Population
Term					
	2012	2013	2014	2015	Spring 2015
Term Headcount	887	831	818	825	6,944

Gender: Females outnumbered males in the Life Science program by approximately 3:1. During the time period studied, the percentage of females in the Life Science program ranges from 74.2-79.1% whereas the percentage of female students for all ECC Compton Center programs is 63.4-64.1%. Conversely, the percentage of male students in the Life Science program is 24.0-26.7% while the overall percentage of male students enrolled at ECC Compton Center is 35.9-36.2%. Hence, the Life Science program has a disproportionately higher number of female students than male students when compared to the campus as a whole. One possible explanation is that the majority of the students in our program pursue traditionally female-dominated careers including nursing or other healthcare-related careers. According to beckershospitalreview.com in 2015 the ratio of female to male nurses 9.5 to 1 (nationwide) and 5.8 to 1 in California. Recruitment efforts targeting the males on campus may be a potential area for enrollment growth in the Life Science program.

		Fall				Compton Student Population
		Term				
		2011	2012	2013	2014	Fall 2014
Gender	F	74.9%	75.1%	79.1%	74.8%	63.4%
	M	25.1%	24.9%	26.7%	25.2%	36.2%
		Spring				Compton Student Population
		Term				
		2012	2013	2014	2015	Spring 2015
Gender	F	74.2%	74.6%	75.9%	76.0%	64.1%
	M	25.8%	25.4%	24.1%	24.0%	35.9%

Ethnicity: The Life Science program serves an ethnically diverse student body. The percentage of Latino students consistently increased from 40.7% to 52.7% between the Spring 2012 and Spring 2015 semesters. The percentage of African-American students remained fairly constant around 28.1-34.9%. However, there was a 6.6% decline in African-American students between the Spring 2013 and Spring 2014 semesters. The percentage of both Latino students as well as African-American students was slightly lower in the Life Science program as when compared to the Compton Center overall numbers. Hence, recruitment of this demographic of students is one potential area for growth.

The percentage of Asian students ranges from 12.37-14.8% during 2011-2013 but declined to 9.0% during Fall 2014. The Life Science program has a considerably higher percentage of Asian students than the rest of the Compton Center, which was 4.7% during Fall 2014. In the Spring semesters, Asian students represented 9.8-12.6% of students in Life Science program. Science classes are sought after everywhere and other local colleges are limited in their capacity to offer

these in-demand courses. Many students come from outside of our district to take advantage of the classes we offer. White students represent about 3.8-6.2% of students in Life Science program during this period.

Fall						Compton Student Population
		Term				
		2011	2012	2013	2014	Fall 2014
Ethnicity	African-American	32.6%	30.7%	30.4%	31.0%	34.6%
	Amer. Ind. or Alask. Native	0.1%	0.2%	0.1%	0.0%	0.2%
	Asian	14.0%	14.8%	12.7%	9.0%	4.7%
	Latino	41.9%	43.4%	53.8%	52.0%	53.7%
	Pacific Islander	0.5%	0.5%	1.0%	0.7%	0.7%
	White	5.8%	5.0%	4.2%	4.8%	2.9%
	Two or More	2.5%	4.0%	2.9%	2.1%	2.7%
	Unknown or Decline	2.6%	1.5%	0.7%	0.3%	0.5%
Spring						Compton Student Population
		Term				
		2012	2013	2014	2015	Spring 2015
Ethnicity	African-American	34.9%	34.8%	28.2%	28.1%	32.5%
	Amer. Ind. or Alask. Native	0.3%	0.5%	0.1%	0.2%	0.2%
	Asian	12.6%	12.3%	9.8%	10.2%	5.0%
	Latino	40.7%	42.6%	53.9%	52.7%	55.2%
	Pacific Islander	0.8%	0.5%	0.6%	1.2%	0.7%
	White	6.2%	4.2%	3.8%	4.1%	3.0%
	Two or More	2.1%	3.9%	3.2%	2.7%	2.8%
	Unknown or Decline	2.3%	1.3%	0.4%	0.7%	0.5%

Age-Structure: The age range for Life Science students goes from younger than 17 to over the age of 65. The median age for students in the Life Science program is 41 years old. About 45% of students in Life Science program belong to age group 20-24.

		Fall				Compton Student Population
		Term				
		2011	2012	2013	2014	Fall 2014
Age/ Age Group	<17	0.0%	0.0%	0.1%	0.0%	0.6%
	17	0.2%	0.1%	0.2%	0.1%	2.2%
	18	2.2%	1.3%	1.1%	1.9%	7.5%
	19	8.0%	8.5%	6.9%	6.6%	9.2%
	20	11.0%	11.1%	10.3%	9.2%	9.8%
	21	12.2%	11.0%	11.2%	10.7%	9.5%
	22	5.5%	8.7%	8.5%	9.5%	7.5%
	23	7.7%	7.9%	8.0%	8.8%	6.3%
	24	6.1%	6.4%	6.7%	8.3%	5.9%
	25-29	19.6%	18.1%	22.6%	19.8%	16.5%
	30-39	18.7%	16.4%	21.0%	15.7%	13.9%
	40-49	7.2%	6.9%	6.8%	6.0%	6.5%
	50-64	1.6%	3.4%	2.1%	2.9%	3.6%
	65+	0.0%	0.1%	0.4%	0.3%	0.4%
		Spring				Compton Student Population
		Term				
		2012	2013	2014	2015	Spring 2015
Age/ Age Group	<17	0.2%	0.2%	0.0%	0.1%	0.9%
	17	0.0%	0.5%	0.1%	0.4%	1.4%
	18	3.3%	3.1%	2.4%	3.5%	6.0%
	19	8.8%	6.4%	6.6%	6.3%	8.4%
	20	10.0%	11.3%	11.5%	8.4%	9.1%
	21	10.0%	12.0%	9.5%	9.3%	8.2%
	22	7.9%	7.6%	9.9%	10.1%	7.4%
	23	6.5%	6.0%	9.8%	8.0%	6.3%
	24	5.0%	5.8%	6.5%	7.8%	5.1%
	25-29	19.2%	20.1%	19.4%	22.3%	16.1%
	30-39	18.2%	18.8%	15.5%	14.5%	12.8%
	40-49	7.7%	6.6%	6.2%	6.5%	6.2%
	50-64	3.2%	1.6%	2.2%	2.5%	3.9%
	65+	0.1%	0.0%	0.2%	0.2%	0.4%

Class Load: The percentage of part-time students is slightly higher while we have a lower percentage of full-time students than that of the overall Compton Center student population. Our program may serve more working professionals who are only attending college part-time and taking one or two classes each semester for career advancement.

Fall						Compton Student Population
Term						
						Fall 2014
Class Load		2011	2012	2013	2014	
		Full-time	21.3%	16.4%	22.2%	22.8%
	Part-time	78.7%	83.6%	83.6%	77.2%	73.3%
Spring						Compton Student Population
Term						
						Spring 2015
Class Load		2012	2013	2014	2015	
		Full-time	22.8%	16.5%	21.4%	21.6%
	Part-time	77.2%	79.9%	78.6%	78.4%	71.5%

Academic level: The percentage of students in the Life Science program who already have college degrees is nearly double that of the rest of the campus. One possible explanation is that this program attracts students seeking retraining in the area of healthcare.

Fall						Compton Student Population	
Term							
						Fall 2014	
Academic Level		2011	2012	2013	2014		
		College degree	19.6%	22.1%	23.6%	18.7%	10.0%
		HS Grad	78.6%	75.7%	79.4%	79.1%	81.6%
		Not a HS Grad	0.9%	1.2%	0.4%	0.3%	0.4%
		K-12 Special Admit	0.0%	0.0%	0.1%	0.0%	2.1%
	Unknown	0.9%	1.0%	2.3%	1.9%	5.9%	
Spring						Compton Student Population	
Term							
						Spring 2015	
Academic Level		2012	2013	2014	2015		
		College degree	19.4%	17.7%	19.4%	18.3%	9.9%
		HS Grad	78.1%	79.7%	78.2%	77.8%	81.5%
		Not a HS Grad	1.7%	0.2%	0.2%	0.4%	3.1%
		K-12 Special Admit	0.0%	0.6%	0.1%	0.6%	2.8%
	Unknown	0.8%	1.8%	2.0%	2.9%	4.8%	

b) Course Grade Distribution

Anatomy Grade Distribution, Success Rates, and Retention Rates

Year	COURSE	Method	We	Grade I											Total	Succ.	Reten.
				'A'	'B'	'C'	'P'	'D'	'F'	'NP'	Inc P	Inc NP	'DR'	'W'			
2011	ANAT-30	Lecture	14	4	14	9		1	4		-	-	1	5	38	71.1%	84.2%
			16	13	9	15		9	22		-	-	14	25	107	34.6%	63.6%
	ANAT-32	Lecture	16	44	72	44		22	12		-	-	12	57	263	60.8%	73.8%
2011 Total				61	95	68		32	38		-	-	27	87	408	54.9%	72.1%
2012	ANAT-30	Lecture	16	45	67	74		15	22		-	-	14	61	298	62.4%	74.8%
			16	4	2	5		5	3		-	-	4	6	29	37.9%	65.5%
	ANAT-32	Lecture	16	115	110	79		42	14		-	-	14	122	496	61.3%	72.6%
2012 Total				164	179	158		62	39		-	-	32	189	823	60.9%	73.1%
2013	ANAT-30	Lecture	16	59	52	58		12	11		-	-		49	241	70.1%	79.7%
			16	118	124	118		26	26		-	-		130	542	66.4%	76.0%
2013 Total				177	176	176		38	37		-	-		179	783	67.6%	77.1%
2014	ANAT-30	Lecture	16	44	62	26		8	32		-	-		50	222	59.5%	77.5%
			16	135	147	103		19	49		-	-		217	670	57.5%	67.6%
2014 Total				179	209	129		27	81		-	-		267	892	58.0%	70.1%
2015	ANAT-30	Lecture	16	16	30	15		3	5		-	-		7	76	80.3%	90.8%
			16	91	63	48		27	32		3	-		91	355	57.7%	74.4%
2015 Total				107	93	63		30	37		3	-		98	431	61.7%	77.3%

Anatomy courses have a higher proportion of D, W, and F grades than other Life Science courses because many students have not taken any science class before enrolling in Anatomy. Some took the high school or general Biology class many years ago but no longer remember the concepts. Anatomy is the first course students pursuing nursing and other allied health professions take because we do not have a prerequisite course before taking Anatomy. On the other hand, successful completion of Anatomy 32 is a prerequisite for Physiology 31. Microbiology 33 also requires passing of a prerequisite biology, anatomy, or physiology course with a C or better for students to enroll. Hence, the lack of a prerequisite and enrichment of underprepared students could explain why Anatomy courses have a higher proportion of students earning D and F grades in these courses.

Biology Grade Distribution, Success Rates, and Retention Rates

Year	COURSE	Method	We	Grade I											Total	Succ.	Reten.
				'A'	'B'	'C'	'P'	'D'	'F'	'NP'	Inc P	Inc NP	'DR'	'W'			
2011	BIOL-10	Lecture	16	3	15	19		6	13		-	-	13	59	128	28.9%	43.8%
			14	1		5		2	9		-	-	2	22	41	14.6%	41.5%
2011 Total				4	15	24		8	22		-	-	15	81	169	25.4%	43.2%
2012	BIOL-10	Lecture	16	13	21	45		27	26		-	1	13	117	263	30.0%	50.6%
			16	3	7	6		3	7		-	-	3	24	53	30.2%	49.1%
2012 Total				16	28	51		30	33		-	1	16	141	316	30.1%	50.3%
2013	BIOL-10	Lecture	16	11	24	46		30	32		-	-		136	279	29.0%	51.3%
			16	2	5	4		6	11		-	-		40	68	16.2%	41.2%
2013 Total				13	29	50		36	43		-	-		176	347	26.5%	49.3%
2014	BIOL-10	Lecture	16	9	35	55		24	19		-	-		116	258	38.4%	55.0%
			16	6	5	15			3		-	-		7	36	72.2%	80.6%
			16	3	2	2		1	7		-	-		25	40	17.5%	37.5%
2014 Total				18	42	72		25	29		-	-		148	334	39.5%	55.7%
2015	BIOL-10	Lecture	16	27	35	28		3	8		-	-		24	125	72.0%	80.8%
			16	1	10						2	-		1	14	92.9%	92.9%
2015 Total				28	45	28		3	8		2	-		25	139	74.1%	82.0%

The majority of students who take these courses are enrolled in Biology course for first time. Therefore, the faculty need to make extra effort to stimulate students' interest in these courses.

Many of the Biology courses have success and retention rates around 30% and 50%, respectively, which is dramatically lower than other courses in the Life Science program. The success rates improved to 72% for Biology 10 and increased to 92.9% for Biology 15 in 2015. The change may be the result of a more student-centered classroom and a more caring faculty.

Microbiology Grade Distribution, Success Rates, and Retention Rates

Year	COURSE	Method	We	Grade I											Total	Succ.	Reten.
				'A'	'B'	'C'	'P'	'D'	'F'	'NP'	Inc P	Inc NP	'DR'	'W'			
2011	MICR-33	Lecture	16	17	69	30		4	4		-	-	3	15	142	81.7%	87.3%
2011 Total				17	69	30		4	4		-	-	3	15	142	81.7%	87.3%
2012	MICR-33	Lecture	16	50	97	55		7	2		1	-	16	42	270	75.2%	78.5%
2012 Total				50	97	55		7	2		1	-	16	42	270	75.2%	78.5%
2013	MICR-33	Lecture	16	52	94	52		3	7		-	-		53	261	75.9%	79.7%
2013 Total				52	94	52		3	7		-	-		53	261	75.9%	79.7%
2014	MICR-33	Lecture	16	57	97	52		6	11		1	-		42	266	77.8%	84.2%
2014 Total				57	97	52		6	11		1	-		42	266	77.8%	84.2%
2015	MICR-33	Lecture	16	26	41	13			2		-	-		22	104	76.9%	78.8%
2015 Total				26	41	13			2		-	-		22	104	76.9%	78.8%

The overall distribution of grades is good and the percentages for the success and retention rates for *Microbiology 33* are all above 75%. In 2011, the percentage of students who earned an 'A' grade was 13.7%, it increased to 23.7% in 2012, and remained close to that percentage in both 2014 and 2015. A majority of students earned a 'B' grade followed by grades 'A', 'C', and 'D' or 'F,' respectively. The percentage of students who earned 'D' or 'F' grades was less than 10%.

Physiology Grade Distribution, Success Rates, and Retention Rates

Year	COURSE	Method	We	Grade I											Total	Succ.	Reten.
				'A'	'B'	'C'	'P'	'D'	'F'	'NP'	Inc P	Inc NP	'DR'	'W'			
2011	PHYO-31	Lecture	16	27	46	40		9	1		-	-	3	28	154	73.4%	79.9%
2011 Total				27	46	40		9	1		-	-	3	28	154	73.4%	79.9%
2012	PHYO-31	Lecture	16	60	86	57		12	2		-	-	12	77	306	66.3%	70.9%
2012 Total				60	86	57		12	2		-	-	12	77	306	66.3%	70.9%
2013	PHYO-31	Lecture	16	62	92	63		18	7		-	-		75	317	68.5%	76.3%
2013 Total				62	92	63		18	7		-	-		75	317	68.5%	76.3%
2014	PHYO-31	Lecture	16	55	122	40		7	2		-	-		53	279	77.8%	81.0%
2014 Total				55	122	40		7	2		-	-		53	279	77.8%	81.0%
2015	PHYO-31	Lecture	16	53	46	25		3	3		-	-		21	151	82.1%	86.1%
2015 Total				53	46	25		3	3		-	-		21	151	82.1%	86.1%

Physiology is an intense subject and students do not seem to be prepared for it. Poor knowledge of chemistry also contributes to students struggling in this class. Although many of the students have taken chemistry as a prerequisite, they do not retain the information. Students who pass Anatomy by memorizing well often struggle in Physiology because the students need to learn a several concepts and be able to apply them.

c) Success Rates

The table below combines 4 tables into one to have better analysis of 4 subjects offered in the Life Science program.

Life Science CEC 2011-15 Success Rates								
	Anatomy		Biology		Microbiology		Physiology	
Year	Total Grades	Success Rate	Total Grades	Success Rate	Total Grades	Success Rate	Total Grades	Success Rate
FA2011	408	54.90%	169	25.40%	142	81.70%	154	73.40%
2012	823	60.90%	316	30.10%	270	75.20%	306	66.30%
2013	783	67.60%	347	26.50%	261	75.90%	317	68.50%
2014	892	58.00%	334	39.50%	266	77.80%	279	77.80%
SP2015	431	61.70%	139	74.10%	104	76.90%	151	82.10%
5 Year Average		64.5%		50.1%		79.6%		71.8%

The success rate for all courses in life sciences ranged from 50.1%-79.6% during 2011-2015. The success rates in Biology were below 40% from Fall 2011 to 2014, bringing down the 5-year average success rate in Biology to 50.1%. The improved success rate in Biology courses coincided with a change in faculty. Additionally, a culture shift promoting a better working environment, more communication between faculty, and improvement in lab activities contributed to the increased success rates.

Anatomy 30, Anatomy 32, Biology 10, Microbiology 33, and Physiology 31 were offered throughout 2011-15. *Biology 15* was not offered from 2011-2013. *Biology 17* was not offered in 2015. *Biology 101* was offered first time in Spring 2015 and *Biology102* was offered in Fall 2015 (not included in table).

Anatomy Success Rate

From Fall 2011 through Spring 2015, the average success rate was 64.5%. The success standard for this time was 61.9%. Success rates and retention rates are low in Anatomy because students are not prepared for it. *Biology 10* is a recommended course in preparation for taking Anatomy courses. Better communication between instructors and counselors could improve the identification and enrollment of students who are likely to be successful in Anatomy versus those students who would be better served by enrolling in *Biology 10* prior to taking Anatomy. Counselors should recommend that underprepared students enroll in *Biology 10* prior to *Anatomy 32*, especially if they have not recently passed a course in Biology.

Additionally, our program has plans to offer a boot camp for students to gain a quick introduction to anatomy before they enroll in the course. Students get overwhelmed by the amount of content covered in the course. The goal of the boot camp is to give students some exposure to the main topics before they take the course.

Program Success Standard	61.9%
5-Year Program Average	64.5%

Year	Total Grades	Success Rate
FA2011	408	54.9%
2012	823	60.9%
2013	783	67.6%
2014	892	58.0%
SP2015	431	61.7%

In Spring 2015, 91 students (28%) out of a total 327, dropped with a ‘W’. In Fall 2015, 126 students (37%) out of a total 343 students, dropped with a ‘W’. This decreased the success rate to 58% in 2014. This could be due to lack of preparedness on the part of the students that enrolled in Anatomy 32. In Spring 2015, only 7 students (9%) out of total 76, dropped with a ‘W’ in Anatomy 30 and 91 students (26%) out of total 355, dropped with a ‘W’ in Anatomy 32. This lowered both success and retention rates. A majority of our students come from economically disadvantaged backgrounds and cannot afford to purchase textbooks and lab manuals. We need to create cheap resources like lab handouts, and guide our students to free resource materials like ‘openstax’ online materials.

Anatomy Success Rate Analysis

Ethnicity: During fall semesters, the two dominant minority groups Latino (50-63%) and African-American students (46-58%) achieve less than 80% of the reference group, white student of 20-24 years (70-88%). These minority students have also been reported to have lower graduation rates in high schools as shown in May 2016 in the following table from California Department of Education. Factors like socioeconomic status, parental education, and support from families were identified to also play a part in the graduation rates. Asian students (71-85%) achieve at par with reference group.

Ethnicity	Cohort Graduation Rate 2013-14	Cohort Graduation Rate 2012-13
Hispanic	76.4	75.7
Asian	92.3	91.6
African American	68.1	68.1
White	87.4	87.7

<http://www.cde.ca.gov/nr/ne/yr15/yr15rel34.asp#tab2>

During fall semesters Latino students have success rate in the range of 51-63%. African-American students have success rate range from 46-58%. Both these groups didn’t achieve 80% of reference group in any of the fall semesters. Asian students achieve 80% of white reference group of ages 20-24. Both Latino and African-American students with 75% and 62% success rate achieved 80% of reference group in Spring 2013 but failed to do so in Springs of 2012,

2014, and 2015. Asian students achieve parity with the reference group. Our faculty members are encouraging students to seek out support services on campus to address this achievement gap.

Gender: Female students outnumber male students three to one. Male and female students achieve about equal success rate in Fall 2011 and 2013 but were well below male students in Fall 2012 and 2014. Female students also achieved lower success rates than male students in Spring 2012 and Spring 2015 but achieved success rates to equal that of male students in Spring 2014. The only time female students had a higher success rate than male students was in Spring 2013. Females in the program were negatively impacted in Spring 2012.

Age Groups: During both fall and spring semesters, age groups 20-24 and 24-49 achieve 80% of reference group made up of white student 20-24 years old. Only the 24-29 age group did so in fall 2012 and 2013. In two fall semesters, the age groups less than 19 years old and more than 49 years old did not achieve 80% of reference group. Likewise, in spring semesters, age group less than 19 in spring 2015 and more than 49 spring 2013 failed to achieve 80% of the reference group. Students who are very young may lack the maturity and skills to succeed in college. On the other hand, students over the age of 49 may be returning to school after many years and may find college a bit challenging.

Success Rates for Anatomy during the Fall Semesters based on Student Demographic

	Fall 2011		Fall 2012		Fall 2013		Fall 2014	
	Success	N	Success	N	Success	N	Success	N
<i>Ethnicity</i>								
African-American	48.2%	112	57.7%	104	57.4%	108	46.3%	160
Amer. Ind. or Alask. Native	0.0%	X	0.0%	X	0.0%	X	0.0%	X
Asian	75.0%	52	70.5%	61	84.6%	52	84.4%	45
Latino	57.6%	172	63.4%	183	59.8%	199	50.6%	231
Pacific Islander	100.0%	X	100.0%	X	75.0%	X	25.0%	X
Two or More	63.6%	11	36.4%	11	71.4%	14	77.8%	X
Unknown or Decline	50.0%	X	71.4%	X	100.0%	X	0.0%	X
White	77.8%	27	84.2%	19	87.5%	16	69.6%	23
<i>Gender</i>								
M	58.7%	92	74.7%	99	63.6%	88	64.5%	110
F	58.8%	289	59.4%	288	64.4%	306	50.3%	362
X	0.0%	X	0.0%	X	0.0%	X	0.0%	X
<i>Age Groups</i>								
19 or less	47.1%	51	51.0%	51	45.7%	35	30.6%	36
20 to 24	56.2%	169	62.6%	182	57.9%	159	54.0%	213
25 to 49	64.7%	156	70.1%	144	75.9%	191	58.7%	208
Over 49	80.0%	X	40.0%	X	0.0%	X	33.3%	15
X: Counts are suppressed for groups with less than 10 students.								
Shaded regions indicate groups achieving at a rate less than 80% of the reference group, respectively. Reference groups are White, male, and 20 to 24 years old.								

Success Rates for Anatomy during the Spring Semesters based on Student Demographic

<i>Ethnicity</i>	Spring 2012		Spring 2013		Spring 2014		Spring 2015	
	Success	N	Success	N	Success	N	Success	N
African-American	55.4%	139	62.4%	141	54.6%	119	47.9%	121
Amer. Ind. or Alask. Native	100.0%	X	50.0%	X	0.0%	X	0.0%	X
Asian	78.0%	50	81.4%	43	83.3%	42	89.8%	49
Latino	61.3%	168	75.2%	161	61.5%	226	60.1%	228
Pacific Islander	25.0%	X	50.0%	X	50.0%	X	80.0%	X
Two or More	75.0%	X	72.2%	18	88.9%	X	90.9%	11
Unknown or Decline	60.0%	X	83.3%	X	100.0%	X	75.0%	X
White	89.3%	28	75.0%	16	77.8%	18	76.9%	13
<i>Gender</i>								
M	77.3%	97	62.8%	86	62.9%	89	71.7%	106
F	59.0%	307	73.3%	303	62.8%	331	58.5%	325
X	0.0%	X	0.0%	X	0.0%	X	0.0%	X
<i>Age Groups</i>								
19 or less	63.2%	68	65.9%	44	52.1%	48	41.9%	62
20 to 24	59.1%	164	70.2%	168	54.3%	175	60.5%	177
25 to 49	66.5%	164	73.7%	171	72.3%	184	68.9%	183
Over 49	87.5%	X	50.0%	X	84.6%	13	77.8%	X

X: Counts are suppressed for groups with less than 10 students.
Shaded regions indicate groups achieving at a rate less than 80% of the reference group, respectively. Reference groups are White, male, and 20 to 24 years old.

Biology

The 5-year program average for the Biology success rate is around 50% and success standard 44%. Success rates remained very low from 25-40% from Fall 2012 to Fall 2014. The success rate improved to 74% in Spring 2015. A new set of part time and full-time faculty may be responsible for the improved results in 2015. The college has hired three new full-time faculty members in the last two years in the Life Sciences. The hiring of new faculty members seems to have improved the overall success rate in Biology.

Program Success Standard	43.7%
5-Year Program Average	50.1%

Year	Total Grades	Success Rate
FA2011	169	25.4%
2012	316	30.1%
2013	347	26.5%
2014	334	39.5%
SP2015	139	74.1%

Previous years were quite disappointing but a positive change was recorded in Spring 2015. The success rate was much higher than both the program standard and 5-year average. It may be due to a cumulative effect of many changes in the program a previously mentioned.

Biology Success Rate Analysis

Ethnicity: During fall semesters the success rate was very low for both Latino and African-American students in Biology. The success rates for Latino students was 30-42% and African-American students was 14-34%. The impact was not observed only in fall 2014 for both groups. All other ethnic groups are less than 10 students and not recorded. Latino and African-American students in Biology didn't achieve 80% of reference group in 2012 and 2013 spring semesters. Both these groups achieved 80% of reference group in 2014 and 2015. Latino students achieved 22-80% success rate and African-American students achieved success rate of 17-64%.

Gender: There is no clear pattern of better performance either by male or female students in Biology fall courses. Both groups have low success rate through Fall 2014. During spring semesters, female students achieve more than male students in all except in spring 2013. During this semester female students didn't achieve 80% of reference group. Females had a success rate of 22% compared to 33% found with males. However, it improved to 77% in Spring 2015.

Age Groups: As observed in Anatomy, during Fall 2012 and 2014 semesters, age groups less than 19 and higher than 49 did not achieve 80% of reference group. In spring, only age group higher than 49 didn't achieve 80% of reference group in Spring 2015 semester.

Success Rates for Biology during Fall Semesters based on Student Demographic

<i>Ethnicity</i>	Fall 2011		Fall 2012		Fall 2013		Fall 2014	
	Success	N	Success	N	Success	N	Success	N
African-American	13.8%	65	22.7%	66	14.3%	49	33.9%	56
Amer. Ind. or Alask. Native	0.0%	X	0.0%	X	0.0%	X	0.0%	X
Asian	100.0%	X	40.0%	X	50.0%	X	0.0%	X
Latino	34.1%	82	33.3%	72	29.8%	124	42.0%	131
Pacific Islander	0.0%	X	0.0%	X	0.0%	X	0.0%	X
Two or More	0.0%	X	33.3%	X	0.0%	X	33.3%	X
Unknown or Decline	50.0%	X	50.0%	X	100.0%	X	100.0%	X
White	100.0%	X	75.0%	X	100.0%	X	33.3%	X
<i>Gender</i>								
M	32.1%	53	25.9%	54	34.4%	61	32.9%	85
F	25.7%	101	33.0%	106	24.0%	121	43.8%	112
X	0.0%	X	0.0%	X	0.0%	X	0.0%	X
<i>Age Groups</i>								
19 or less	25.0%	32	10.0%	20	31.0%	29	30.6%	36
20 to 24	31.1%	74	32.9%	76	25.5%	106	41.4%	111
25 to 49	25.5%	47	35.7%	56	29.5%	44	38.6%	44
Over 49	0.0%	X	25.0%	X	33.3%	X	50.0%	X

X: Counts are suppressed for groups with less than 10 students.

Shaded regions indicate groups achieving at a rate less than 80% of the reference group, respectively. Reference groups are White, male, and 20 to 24 years old.

Success Rates for Biology during Spring Semesters based on Student Demographic

Ethnicity	Spring 2012		Spring 2013		Spring 2014		Spring 2015	
	Success	N	Success	N	Success	N	Success	N
African-American	17.3%	52	20.0%	55	36.4%	33	64.3%	42
Amer. Ind. or Alask. Native	0.0%	X	100.0%	X	0.0%	X	0.0%	X
Asian	60.0%	X	50.0%	X	50.0%	X	60.0%	X
Latino	39.4%	71	22.2%	90	41.3%	92	80.2%	81
Pacific Islander	0.0%	X	0.0%	X	0.0%	X	100.0%	X
Two or More	0.0%	X	42.9%	X	50.0%	X	100.0%	X
Unknown or Decline	0.0%	X	100.0%	X	50.0%	X	100.0%	X
White	60.0%	X	66.7%	X	33.3%	X	40.0%	X
<i>Gender</i>								
M	30.0%	50	31.7%	60	30.6%	49	67.4%	43
F	34.4%	90	21.9%	105	45.5%	88	77.1%	96
X	0.0%	X	0.0%	X	0.0%	X	0.0%	X
<i>Age Groups</i>								
19 or less	30.8%	26	22.6%	31	55.0%	20	81.0%	21
20 to 24	37.5%	64	21.8%	87	32.6%	89	76.0%	75
25 to 49	31.8%	44	35.6%	45	52.0%	25	70.3%	37
Over 49	0.0%	X	0.0%	X	66.7%	X	50.0%	X

X: Counts are suppressed for groups with less than 10 students.
 Shaded regions indicate groups achieving at a rate less than 80% of the reference group, respectively. Reference groups are White, male, and 20 to 24 years old.

Microbiology

The 5-year program average success rate in Microbiology is 79.6% and the program success standard is 77.2%. Success rates in Microbiology are relatively high. Only students with a 'C' or higher in a prerequisite Biology, Anatomy, or Physiology course can enroll in Microbiology. Students in Microbiology thus have a stronger background going into the course.

Program Success Standard	77.2%
5-Year Program Average	79.6%

Year	Total Grades	Success Rate
FA2011	142	81.7%
2012	270	75.2%
2013	261	75.9%
2014	266	77.8%
SP2015	104	76.9%

Although the success rate for Microbiology is good, it dropped below the 77.2% program success standard in 2012, 2013, and in Spring of 2015. Microbiology is a very lab-oriented, hands on course. One reason that the success rate is slightly lower than the standard could be due to technical difficulties encountered in the microbiology lab. The students tend to score higher on the lecture-specific content of the course. Our students need to develop the skills and master the

techniques, so we have focused on improving our standard of technical help to handle technical issues that arise in lab. We anticipate that we will see an increase in the success rate of this course accordingly.

Microbiology Success Rate Analysis

Ethnicity: During fall semesters, the success rate is good for both Latino and African-American students in Microbiology but this group still achieved less than Asian and White students. The success rates were 65-84% for Latino students and 61-76% for African-American students. During spring semesters in Microbiology, Latino and African-American students didn't achieve 80% of reference group in 2013 and spring 2014. Latino students achieved a 72-79% success rate and African-American students achieved success rate of 64-86%.

Gender: Male students in Microbiology achieved better success rates than female students in fall courses from 2011-13. Female students with 82% success rate performed better than male students (75%) in Fall 2014. During spring semesters, male students performed better than female students in all semesters except in Spring 2015 when female students achieved 80% success compared to 61% for male students.

Age Groups: During the Fall 2013 semester, age groups younger than and older than 49 did not achieve 80% of reference group, but only age group older than 49 didn't perform up to 80% of reference group in spring 2013 and 2014 semesters.

Success Rates for Microbiology during Fall Semesters based on Student Demographic

	Fall 2011		Fall 2012		Fall 2013		Fall 2014	
	Success	N	Success	N	Success	N	Success	N
<i>Ethnicity</i>								
African-American	75.5%	49	85.0%	40	61.0%	41	74.4%	43
Amer. Ind. or Alask. Native	0.0%	X	0.0%	X	0.0%	X	0.0%	X
Asian	92.3%	26	91.7%	24	84.2%	19	100.0%	19
Latino	83.7%	43	65.2%	46	74.1%	54	78.8%	66
Pacific Islander	100.0%	X	66.7%	X	100.0%	X	0.0%	X
Two or More	87.5%	X	100.0%	X	50.0%	X	100.0%	X
Unknown or Decline	75.0%	X	100.0%	X	100.0%	X	0.0%	X
White	100.0%	X	85.7%	X	77.8%	X	100.0%	X
<i>Gender</i>								
M	90.0%	30	81.5%	27	76.0%	25	75.0%	20
F	81.7%	109	79.2%	101	70.2%	104	82.2%	118
X	0.0%	X	0.0%	X	0.0%	X	0.0%	X
<i>Age Groups</i>								
19 or less	40.0%	X	83.3%	X	100.0%	X	100.0%	X
20 to 24	85.1%	47	80.0%	50	71.1%	38	76.3%	59
25 to 49	85.0%	80	77.9%	68	71.8%	85	84.7%	72
Over 49	85.7%	X	100.0%	X	50.0%	X	75.0%	X
X: Counts are suppressed for groups with less than 10 students.								
Shaded regions indicate groups achieving at a rate less than 80% of the reference group, respectively. Reference groups are White, male, and 20 to 24 years old.								

Success Rates for Microbiology during Spring Semesters based on Student Demographic

Ethnicity	Spring 2012		Spring 2013		Spring 2014		Spring 2015	
	Success	N	Success	N	Success	N	Success	N
African-American	81.6%	38	68.2%	44	63.9%	36	86.1%	36
Amer. Ind. or Alask. Native	0.0%	X	0.0%	X	0.0%	X	0.0%	X
Asian	84.6%	26	100.0%	23	92.9%	14	61.5%	13
Latino	74.4%	43	79.2%	48	72.3%	65	75.0%	44
Pacific Islander	100.0%	X	50.0%	X	0.0%	X	100.0%	X
Two or More	100.0%	X	100.0%	X	100.0%	X	100.0%	X
Unknown or Decline	87.5%	X	100.0%	X	0.0%	X	0.0%	X
White	83.3%	X	100.0%	X	83.3%	X	66.7%	X
Gender								
M	86.2%	29	93.8%	32	76.7%	30	61.1%	18
F	78.4%	97	76.0%	100	73.5%	98	80.2%	86
X	0.0%	X	0.0%	X	0.0%	X	0.0%	X
Age Groups								
19 or less	100.0%	X	80.0%	X	80.0%	X	0.0%	X
20 to 24	78.0%	41	78.0%	41	65.1%	63	76.6%	47
25 to 49	79.2%	72	82.1%	84	85.7%	56	77.8%	54
Over 49	87.5%	X	50.0%	X	50.0%	X	66.7%	X

X: Counts are suppressed for groups with less than 10 students.
 Shaded regions indicate groups achieving at a rate less than 80% of the reference group, respectively. Reference groups are White, male, and 20 to 24 years old.

Physiology

The average success rate for Physiology is 72% and program success standard is 68%.

Program Success Standard	68.1%
5-Year Program Average	71.8%

Year	Total Grades	Success Rate
FA2011	154	73.4%
2012	306	66.3%
2013	317	68.5%
2014	279	77.8%
SP2015	151	82.1%

Success rates in Human physiology remained above the program standard and 5-year average, except in AY 2012 when it fell slightly below the program standard and 5-year average. It has since ~~then~~ been improving. In particular, it was 82% in Spring 2015. We bought a number of equipment like BIOPAC and microscopes which may have contributed to the improved success rates. Human Physiology has been taught in the last three years by full time faculty. One other

explanation for the improvement could be the use of a separate, dedicated lecture/laboratory space, MS 103 for Physiology since fall 2014.

Physiology Success Rate Analysis

Ethnicity: Success rates in fall ranged from 65-70% for Latino students and 59-75% for African-American students. Latino and African-American students didn't achieve 80% of our reference group. Latinos did not achieve 80% of the rates for Whites in 2011, 2013, and 2014 while African Americans did not in 2013 and 2014. During spring semesters, Latino students taking Physiology did not achieve 80% of reference group in 2012 and 2014 while African-American students didn't achieve 80% of reference group in 2013 and 2015. Latino students achieved 60-82% success rate and African-American students achieved success rate of 40-81% between 2012 and 2015.

Gender: Male students in 2011 and 2014 and female students in 2012 and 2013 performed better than the opposite gender in Physiology. During spring semesters male students achieve more than female students in all semesters.

Age Groups: During fall semesters, the age group less than 19 years old did not achieve 80% of reference group one semester (2013) but in spring semesters age groups less than 19 years old and more than 49 years old did not achieve 80% of the reference group in spring 2015 and 2012, respectively. In all Life Science courses age groups 20-24 and 24-49 always achieved at least 80% of reference group. These are the main college going groups, probably now mature and determined in their quest for success.

Success Rates for Physiology during Fall Semesters based on Student Demographic

	Fall 2011		Fall 2012		Fall 2013		Fall 2014	
<i>Ethnicity</i>	Success	N	Success	N	Success	N	Success	N
African-American	75.0%	40	59.1%	44	69.8%	53	75.0%	36
Amer. Ind. or Alask. Native	100.0%	X	100.0%	X	0.0%	X	0.0%	X
Asian	82.1%	39	70.4%	27	90.6%	32	90.0%	20
Latino	65.2%	46	67.2%	58	70.0%	70	69.1%	68
Pacific Islander	0.0%	X	0.0%	X	100.0%	X	100.0%	X
Two or More	33.3%	X	90.0%	X	71.4%	X	85.7%	X
Unknown or Decline	90.0%	X	100.0%	X	66.7%	X	50.0%	X
White	90.9%	11	72.7%	11	100.0%	X	100.0%	12
<i>Gender</i>								
M	78.1%	32	65.4%	26	72.3%	47	96.0%	25
F	73.9%	119	68.3%	126	76.0%	125	72.7%	121
X	0.0%	X	0.0%	X	0.0%	X	0.0%	X
<i>Age Groups</i>								
19 or less	100.0%	X	100.0%	X	33.3%	X	85.7%	X
20 to 24	74.2%	62	60.0%	65	72.1%	68	75.4%	61
25 to 49	75.9%	87	69.3%	75	78.4%	97	77.8%	72
Over 49	0.0%	X	100.0%	X	75.0%	X	66.7%	X

X: Counts are suppressed for groups with less than 10 students.

Shaded regions indicate groups achieving at a rate less than 80% of the reference group, respectively. Reference groups are White, male, and 20 to 24 years old.

Success Rates for Physiology during Spring Semesters based on Student Demographic

Ethnicity	Spring 2012		Spring 2013		Spring 2014		Spring 2015	
	Success	N	Success	N	Success	N	Success	N
African-American	65.9%	44	40.8%	49	81.4%	43	72.7%	33
Amer. Ind. or Alask. Native	0.0%	X	0.0%	X	0.0%	X	0.0%	X
Asian	95.7%	23	89.3%	28	86.4%	22	88.2%	17
Latino	60.7%	56	61.8%	55	75.9%	58	81.7%	82
Pacific Islander	0.0%	X	0.0%	X	0.0%	X	100.0%	X
Two or More	100.0%	X	0.0%	X	50.0%	X	100.0%	X
Unknown or Decline	80.0%	X	100.0%	X	0.0%	X	100.0%	X
White	77.8%	X	75.0%	X	100.0%	X	100.0%	X
Gender								
M	79.3%	29	69.7%	33	82.8%	29	93.5%	31
F	68.1%	113	58.0%	112	77.9%	104	79.2%	120
X	0.0%	X	0.0%	X	0.0%	X	0.0%	X
Age Groups								
19 or less	75.0%	X	100.0%	X	0.0%	X	50.0%	X
20 to 24	80.8%	52	52.5%	59	72.9%	59	81.7%	60
25 to 49	66.3%	80	64.1%	78	86.1%	72	83.3%	84
Over 49	33.3%	X	66.7%	X	0.0%	X	80.0%	X

X: Counts are suppressed for groups with less than 10 students.
 Shaded regions indicate groups achieving at a rate less than 80% of the reference group, respectively. Reference groups are White, male, and 20 to 24 years old.

d) Retention rates

During 2011-15 the retention rates ranged from 70.5-79.9%. The following table combines 4 tables into one to have better analysis of 4 subjects offered in life science program.

Year	Anatomy		Biology		Microbiology		Physiology	
	Total Grades	Retention Rate	Total Grades	Retention Rate	Total Grades	Retention Rate	Total Grades	Retention Rate
FA2011	408	72.10%	169	43.20%	142	87.30%	154	79.90%
2012	823	73.10%	316	50.30%	270	78.50%	306	70.90%
2013	783	77.10%	347	49.30%	261	79.70%	317	76.30%
2014	892	70.10%	334	55.70%	266	84.20%	279	81.00%
SP2015	431	77.30%	139	82.00%	104	78.80%	151	86.10%

The retention rates through the years and among the courses stay above 70% except Biology from 2011 to 2014. The retention rates therefore mirrored the success rates discussed in the

previous section. This is as expected since success rate depends on how many completed the class. However, a 70% retention is not good enough because this will be reflected on the persistence of the students in our program. About one third of students enrolled in Biology for non-majors and Anatomy courses are not properly prepared. Many of them, especially in Anatomy, withdraw from the class one or more times before passing the course. Many of the Latino students speak English as a second language and lack the required English reading and writing skills. Finally, the program will continue to work to improve communication between counselors and its instructors.

e) Comparison of Success and Retention Rates in Face-to-face classes with Distance Education Classes

During this time only one distance education class was offered, Anatomy 32 in 2012. The success rate was 38% and retention rate was 65%. The 5-year average of success rate in face to face classes is 66% and retention rate is 74%. Therefore, both success and retention rates were lower in this online class than face-to-face classes. There is a growing trend and demand from students for online and hybrid courses. Although the one trial of offering a hybrid *Anatomy 32* course was unsuccessful, we plan to pilot more online and hybrid Anatomy and Biology courses in the near future.

f) Enrollment Statistics

Anatomy

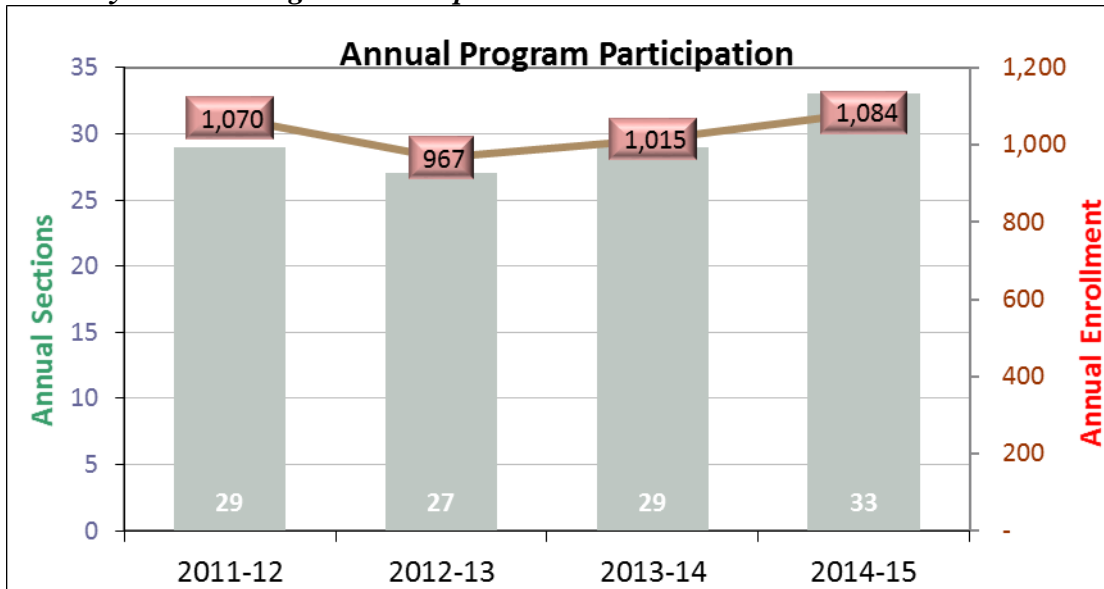
Anatomy has continued to produce good enrollment numbers. The annual enrollment varies from 967 to 1,084, which reflects the number of sections offered. In 2012-2013, the Life Science program offered 27 sections in Anatomy and had 967 students. In 2014-2015, 33 sections were offered and Anatomy had 1,084 students. During 2011-2015, the fill rate for Anatomy has hovered around 100%. The fill rate and section fill rates were lower in 2012-2013 because fewer sections of the course were offered due to cuts in funding by the California government.

The fill rates were slightly lower during Fall 2014 and Spring 2015 than in previous semesters, although Anatomy sections were still over 99.6% and 100.7% filled. One potential explanation for the slight decline in fill rates could be the availability of funds for colleges to open additional sections.

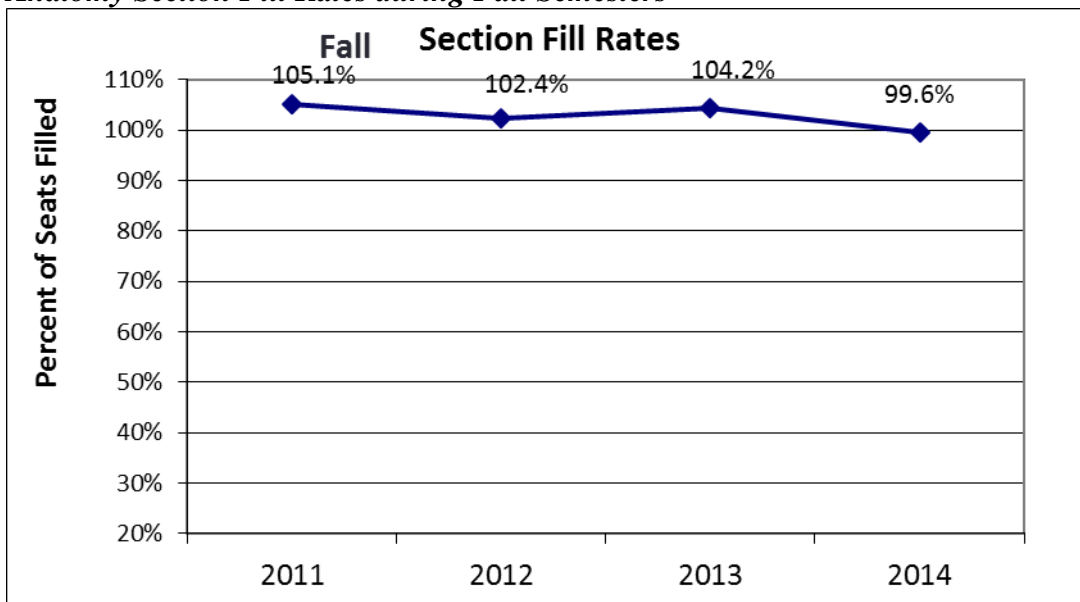
Anatomy Annual Enrollment

	2011-12	2012-13	2013-14	2014-15	4 Yr Average
Annual Enrollment	1,070	967	1,015	1,084	1,034

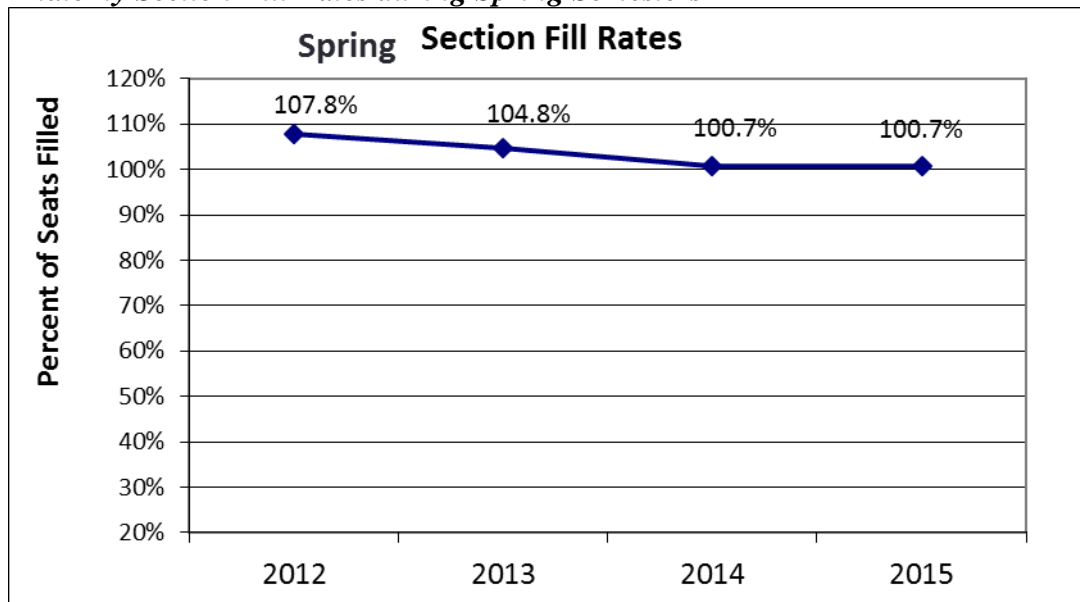
Anatomy Annual Program Participation



Anatomy Section Fill Rates during Fall Semesters



Anatomy Section Fill Rates during Spring Semesters



Biology

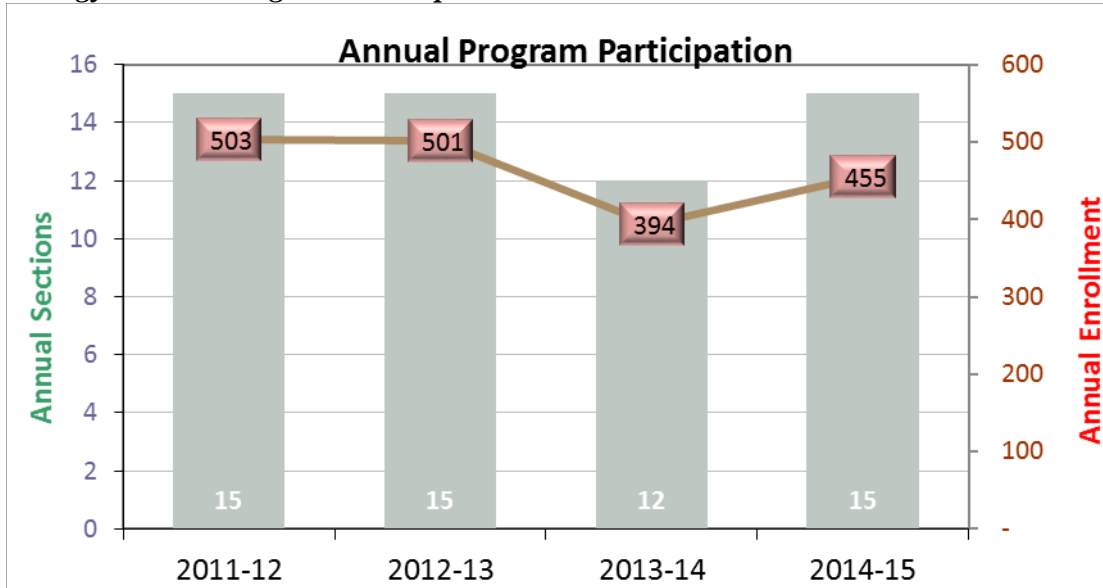
The annual enrollment varies from 394 to 501 and the enrollment correlates with the number of sections offered. Life Science program offered 12 sections in Biology and had 394 students in 2013-2014. But in 2011-2012, 15 sections were offered and Biology had 503 students. The student number declined in 2014-2015 even though 15 sections were offered in biology. If more full-time faculty teach and promote Biology 10, it may encourage more students to pursue higher courses in Life Science program.

During 2011-2015 the section fill rate for Biology was highest at 99% in fall 2013 when 12 sections were offered. The section fill rate was 76% in spring 2013, the lowest during the period of study.

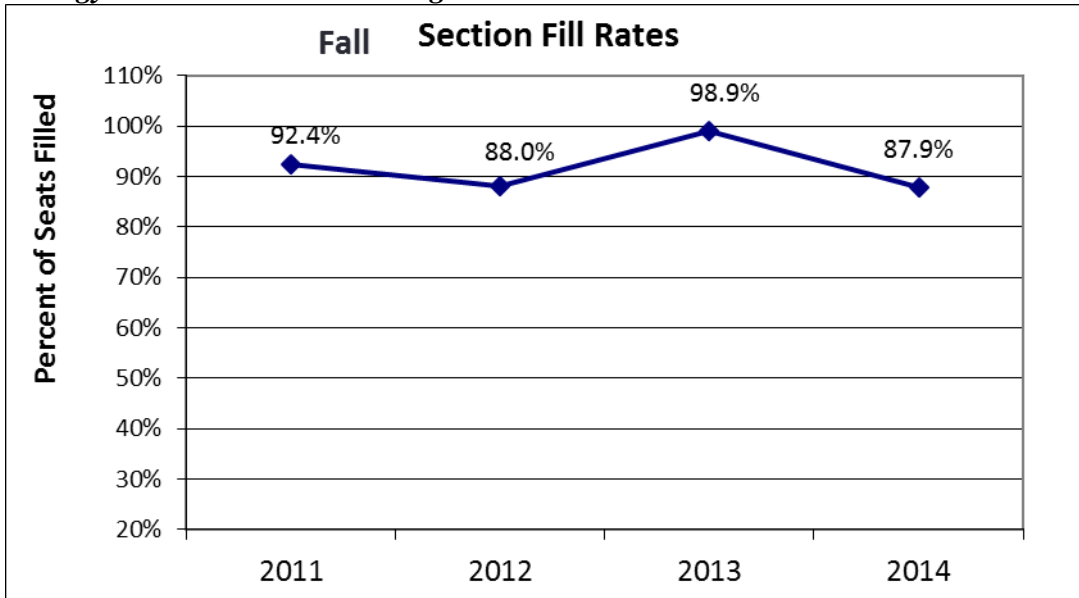
Biology Annual Enrollment

	2011-12	2012-13	2013-14	2014-15	4 Yr Average
Annual Enrollment	503	501	394	455	463

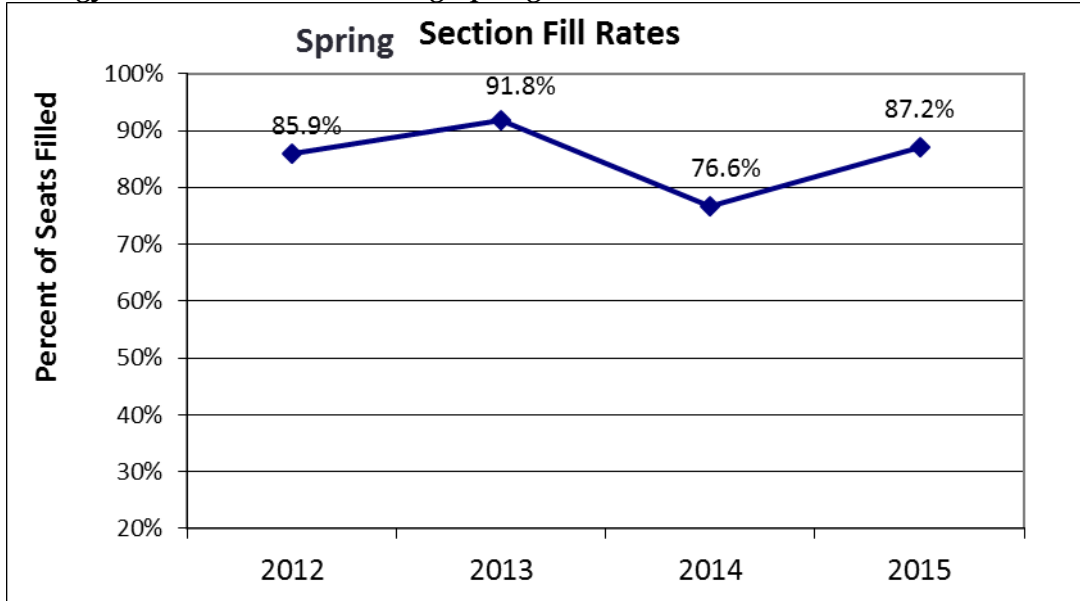
Biology Annual Program Participation



Biology Section Fill Rates during Fall Semesters



Biology Section Fill Rates during Spring Semesters



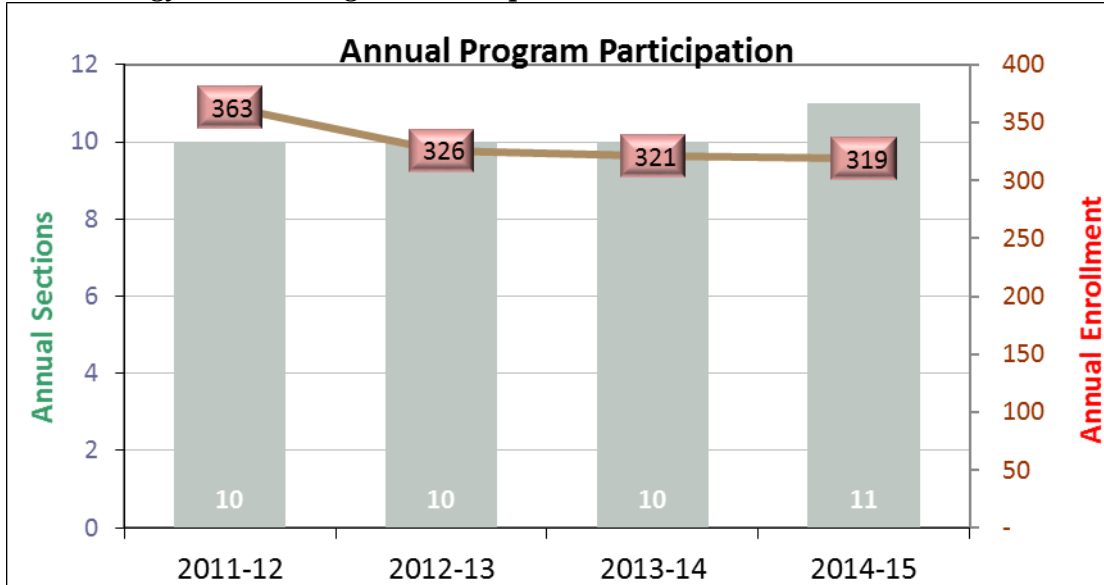
Microbiology

The annual enrollment in Microbiology varies from 319 to 363 students, but the enrollment did not necessarily correlate with the number of sections offered. The Life Science program offered 10 sections in Microbiology in 2011-2014. In 2014-2015, 11 sections were offered, but annual enrollment slightly declined instead of increasing. During 2011-2015, the section fill rate for Microbiology declined from 100% in Spring 2011 to 76% in Spring 2015. This dramatic decrease in enrollment during Spring 2015 can be at least partially accounted for by the additional section of Microbiology that was offered.

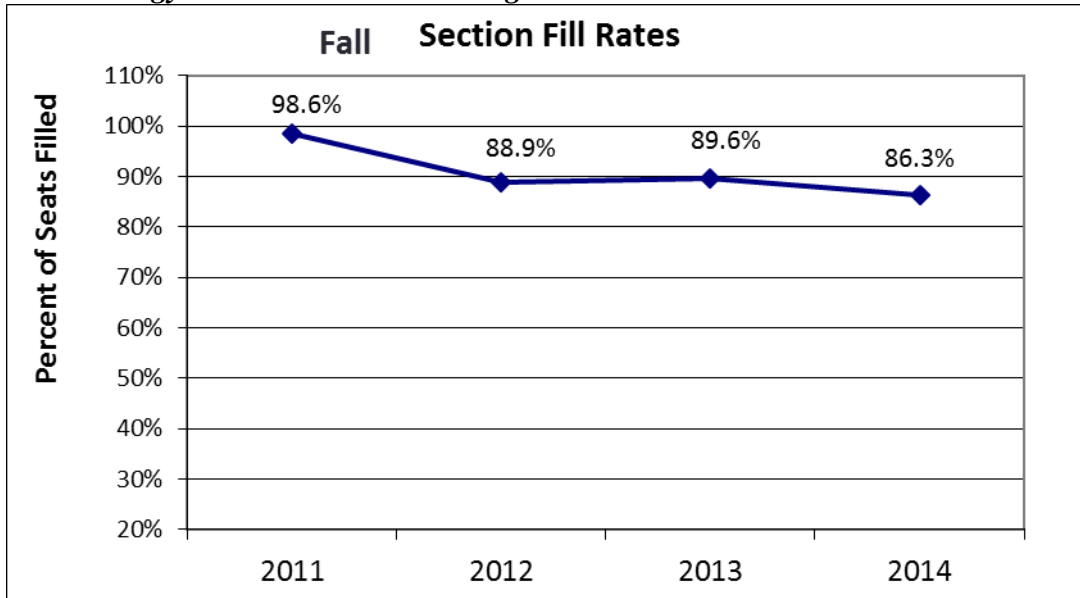
Microbiology Annual Enrollment

	2011-12	2012-13	2013-14	2014-15	4 Yr Average
Annual Enrollment	363	326	321	319	332

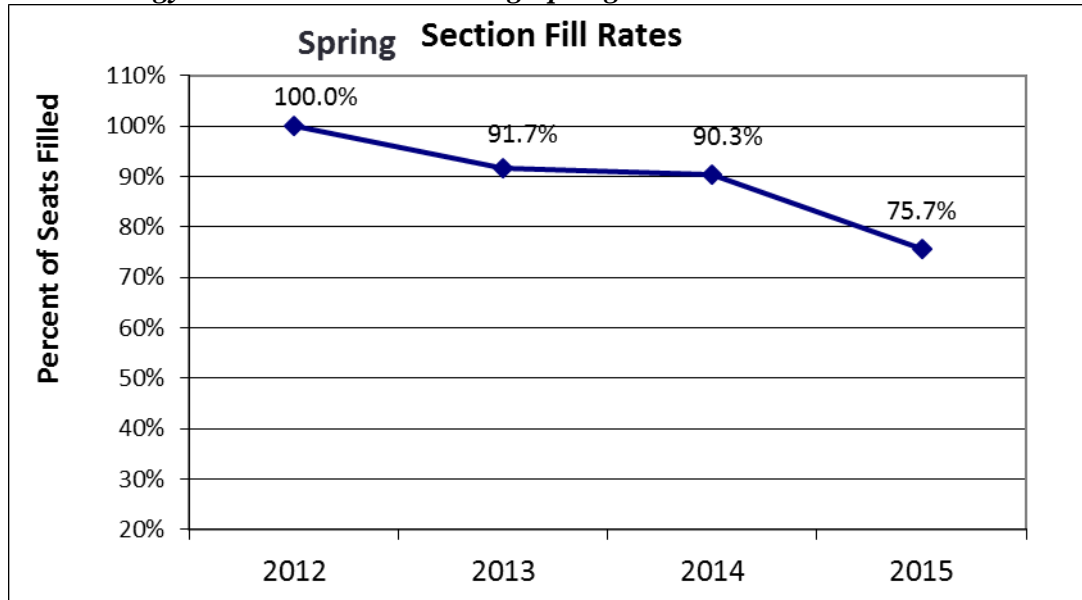
Microbiology Annual Program Participation



Microbiology Section Fill Rates during Fall Semesters



Microbiology Section Fill Rates during Spring Semesters



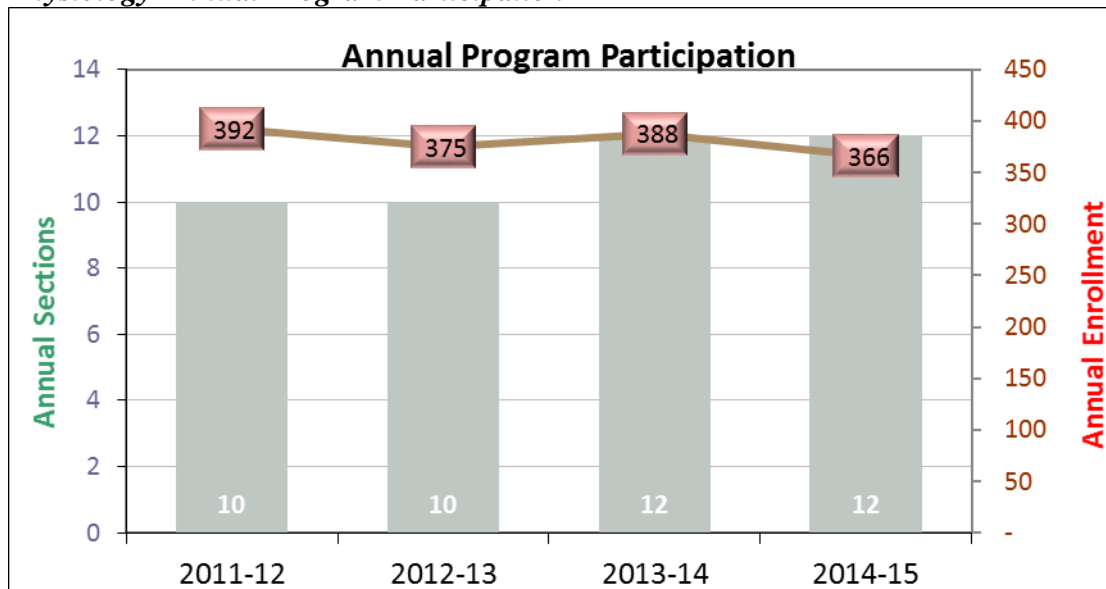
Physiology

Annual enrollment in Physiology varies from 366 to 392. It increased when 12 sections offered in 2013-2014 instead of 10 sections offered in 2011-2013. In 2013-2015, 12 sections were offered. The annual enrollment declined in 2014-15 despite the fact that 12 sections were offered. During 2011-15 the section fill rate for Physiology declined from 107% in 2011 to 76% in Spring 2015 when more sections were offered. The overall section fill rate declined from 2011 to 2015.

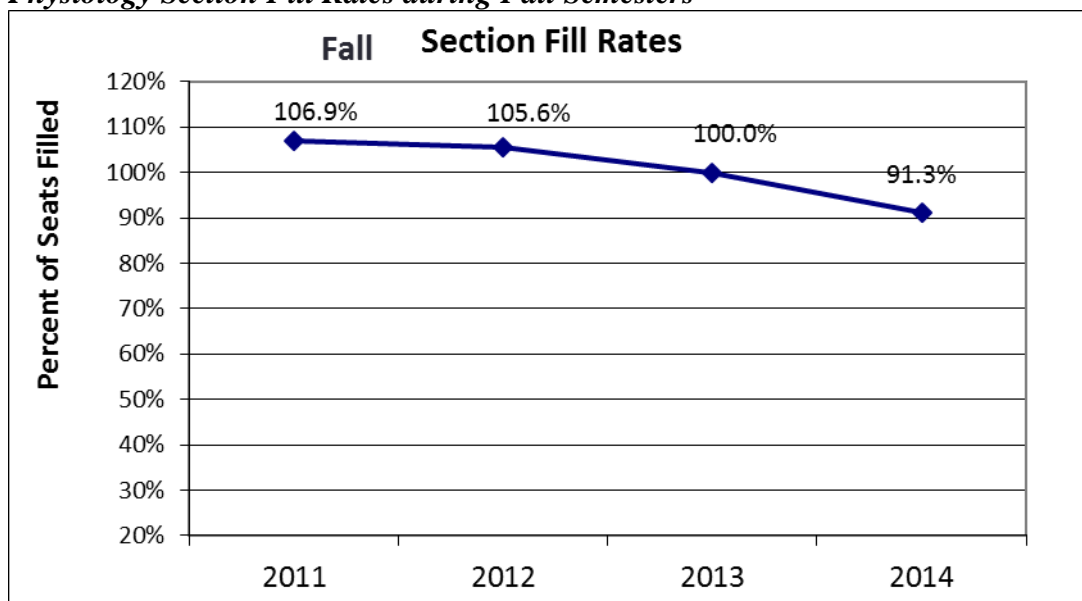
Physiology Annual Enrollment

	2011-12	2012-13	2013-14	2014-15	4 Yr Average
Annual Enrollment	392	375	388	366	380

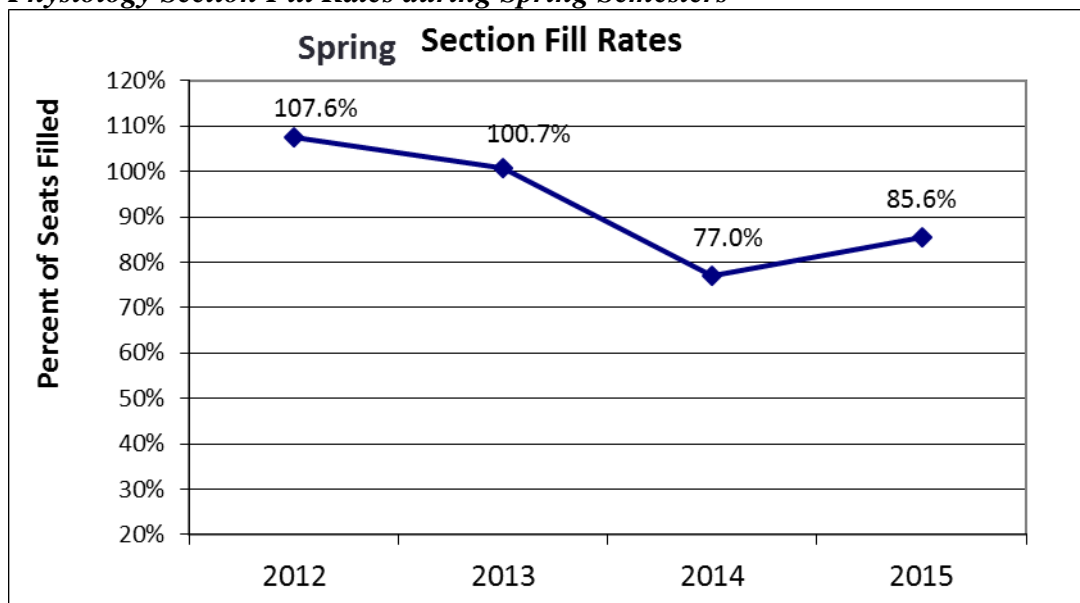
Physiology Annual Program Participation



Physiology Section Fill Rates during Fall Semesters



Physiology Section Fill Rates during Spring Semesters



g) Scheduling of Courses (day vs. night, days offered, and sequence)

The definitions of Day, Night, or Weekend/Unknown students are:

Daytime classes begin weekdays before 4:30 pm. Night classes begin after 4:30 pm.

Classes are Weekend if they include a Saturday or Sunday meeting time and Unknown if there is no set time as in Distance Ed or Work Experience.

Anatomy

Enrollment by Time of Day				
Fall Term	2011	2012	2013	2014
Day	53.9%	58.1%	56.9%	58.9%
Night	46.1%	41.9%	43.1%	41.1%
Weekend/Unknown	0.0%	0.0%	0.0%	0.0%

Enrollment by Time of Day				
Spring Term	2012	2013	2014	2015
Day	60.0%	54.8%	58.7%	59.3%
Night	33.4%	45.2%	41.3%	40.7%
Weekend/Unknown	6.6%	0.0%	0.0%	0.0%

Biology

Enrollment by Time of Day				
Fall Term	2011	2012	2013	2014
Day	61.2%	59.3%	60.4%	67.0%
Night	38.8%	40.7%	39.6%	33.0%
Weekend/Unknown	0.0%	0.0%	0.0%	0.0%

Enrollment by Time of Day				
Spring Term	2012	2013	2014	2015
Day	60.4%	58.6%	51.1%	59.9%
Night	39.6%	41.4%	48.9%	40.1%
Weekend/Unknown	0.0%	0.0%	0.0%	0.0%

Microbiology

Enrollment by Time of Day				
Fall Term	2011	2012	2013	2014
Day	50.7%	49.2%	52.7%	58.6%
Night	49.3%	50.8%	47.3%	41.4%
Weekend/Unknown	0.0%	0.0%	0.0%	0.0%

Enrollment by Time of Day				
Spring Term	2012	2013	2014	2015
Day	49.3%	50.0%	53.8%	54.1%
Night	50.7%	50.0%	46.2%	45.9%
Weekend/Unknown	0.0%	0.0%	0.0%	0.0%

Physiology

Enrollment by Time of Day				
Fall Term	2011	2012	2013	2014
Day	51.9%	48.0%	57.6%	77.4%
Night	48.1%	52.0%	42.4%	22.6%
Weekend/Unknown	0.0%	0.0%	0.0%	0.0%

Enrollment by Time of Day				
Spring Term	2012	2013	2014	2015
Day	49.0%	51.0%	84.3%	78.6%
Night	51.0%	49.0%	15.7%	21.4%
Weekend/Unknown	0.0%	0.0%	0.0%	0.0%

By collecting information about sections offered in day, night, or weekend from college class schedules for Spring 2014, Fall 2014 and Spring 2015 and presenting it against percentage of the total enrollment from the Life Science program in these semesters in the following table:

Scheduling of Life Science Courses 2014-15

Number of Sections Offered Compared to the Percentage of Total Enrollment

	Spring 2014		Fall 2014		Spring 2015		
Time	# of Sections	% of total enrollment	# of Sections	% of total enrollment	# of Sections	% of total enrollment	Course
Day	7	58.7%	8	58.9%	9	59.3%	Anatomy
Night	4	41.3%	4	41.1%	4	40.7%	
Weekend	1	0.0%	1	0.0%	1	0.0%	
Day	4	51.1%	5	67.0%	6	59.9%	Biology
Night	2	48.9%	2	33.0%	2	40.1%	
Weekend	0	0.0%	0	0.0%	0	0.0%	
Day	2	53.8%	3	58.6%	3	54.1%	Microbiology
Night	2	46.2%	2	41.4%	2	45.9%	
Weekend	0	0.0%	0	0.0%	0	0.0%	
Day	4	84.3%	4	77.4%	4	78.6%	Physiology
Night	1	15.7%	1	22.6%	1	21.4%	
Weekend	0	0.0%	0	0.0%	0	0.0%	

Anatomy: The percentage of the total enrollment did not increase for day classes in Anatomy despite the increase in sections from 7 to 9 between Spring 2014 and Spring 2015. The percentage enrollment remained steady around 40% for night classes. Therefore, day classes had enrollment around 60%.

Biology: Only two sections of Biology 10 were offered in the nights while the day classes included Biology 10, Biology 15, and Biology 17.

Microbiology: Increasing the number of day sections to three increased the enrollment in Fall 2014 by 5% but that increase disappeared in Spring 2015. Evening classes have higher percentage enrollment considering sections offered.

Physiology: Considering the sections offered, Spring 2014 day classes had higher percentage enrollment than night classes, but in Fall 2014 and Spring 2015 night classes had higher enrollment.

h) Improvement Rates (if applicable)

The best improvement is in Biology with an increase of 35% from less than 40% to 74% in spring 2015. The success rate in Physiology has improved about 5% every year from 2012 (66%) to spring 2015 (82%).

i) Additional Data

The following additional data tables were compiled by faculty:

1. Combined tables for success rate
2. Combined table for retention rate
3. Combined table for percentage enrollment and day / night / weekend scheduling of classes were created by using information provided by institutional research or using program review data file Compton 2015 and consulting class schedules for Compton center for Spring and Fall semesters of 2014 and 2015.

j) Related Recommendations

1. Our program needs to increase efforts to recruit more males, African American students, and Latino students as they are underrepresented in our program as compared to the campus as a whole.
2. Faculty in the Life Science program should strategize to incorporate free or lower cost textbooks and other materials into our courses.
3. Faculty in the Life Science program need to improve communication with counselors so that students are directed to register for the courses most appropriate for them.
4. The Life Science program needs to offer hybrid and/or online courses to accommodate students who are seeking a more flexible schedule.
5. In terms of scheduling classes, additional sections of Anatomy should be offered, especially during the evening and Sundays.
6. Life Science faculty needs to continue to work to improve the success and retention rates in all the courses but most importantly, in Anatomy.

3. Curriculum

a) Curriculum Course Review Timeline

All the courses taught in the Life Science program are part of the ECC curriculum. The Natural Sciences Curriculum Committee with the participation of our Life Science faculty ensures that the course outlines are reviewed and approved by the ECC College Curriculum Committee at least once in the last six years. The timeline for the review process is shown below:

Table: Course Review Cycle for Compton Life Sciences.

Course	Last	Year 1		Year 2		Year 3		Year 4		Year 5		Year 6	
		Fall 10	Spr 11	Fall 11	Spr 12	Fall 12	Spr 13	Fall 13	Spr 14	Fall 14	Spr 15	Fall 15	Spr 16
Anat 30	2003 - 04			X	X					X			
Anat 32	2003 - 04											X	
Biol 10	2009 - 10												X
Biol 17	2007 - 08							X					
Micro 33	2008 - 09									X			
Phyo 31	2009 - 10							X					

Legend: P – In the year of next course review, X - Semester for the next course review

The following eight courses have been taught in the Life Science Program as stated in the El Camino College Compton Center 2015-2016 catalog:

- (1) Anatomy 30 (*Essentials of Anatomy and Physiology*, 4units)
This course is the study of anatomy coupled with physiology. Students compare the structure and function of human organ systems to those of other vertebrates. The laboratory includes dissection of sheep brains and hearts, cow eyes and other vertebrates. Laboratory experiments reinforce principles of anatomy and the basic principles of chemistry, cell biology, histology, embryology, and genetics.
- (2) Anatomy 32 (*General Human Anatomy*, 4units)
This in-depth course covers all eleven systems of the human body including related histology and pathology. The systems covered are skeletal, muscular, nervous, integument, respiratory, digestive, reproductive, urinary, endocrine, immune, and lymphatic. Models of the human body and dissection of higher vertebrates are emphasized in laboratory. This course is designed for science, health related, pre-nursing (Bachelor of Science in nursing), and pre-professional majors.
- (3) Biology 10 (*Fundamentals of Biology*, 4 units)
This course is a survey of all living things: prokaryotes, protists, fungi plants, and animals. Basic principles of structure, function, and relationships of living organisms are discussed with special reference to humans.

- (4) Biology 15 (*Environmental Aspects of Biology*, 3 units)
Basic ecological and biological principles and concepts are emphasized in the study of the structure and function of ecosystems. Major ecological problems such as overpopulation, resource depletion and food production are related to endangered species and habitat degradation. Environmental pollution of air and water resources is considered in local areas as well as national and international situations. Air quality and global warming issues are considered. Students are encouraged to participate in local activities addressing environmental problems and restoring and improving local habitats.
- (5) Biology 101 (*Principles of Biology I*, 5 units)
New course added in Spring 15, and offered each spring and summer semesters. This course is a survey of eukaryotic organisms, their evolution and ecology. The student will have a thorough exposure to plant and animal anatomy and physiology, and will utilize animal dissection in the lab. Students will be expected to complete a project that includes hypothesis, prediction, experimentation, and presentation of results. This course is one of three courses in the biology series designed for biology majors, including those students planning to pursue a career in medicine, dentistry, or other life sciences.
- (6) Biology 102 (*Principles of Biology II*, 5 units)
New Course added in Fall 15, and offered each fall semester. This course offers a detailed study of eukaryotic cell anatomy, metabolism, and division, including the study of Mendelian genetics and the molecular genetics of eukaryotes. Prokaryotic cellular structure (Eubacteria and Archaea), microbial genetics, and viruses are also studied. The scientific method is discussed in the lecture component and students implement elements of the process in various laboratory exercises. This course is one of three courses in the biology series designed for biology majors, including those students planning to pursue a career in medicine, dentistry, or other life sciences.
- (7) Microbiology 33 (*General Microbiology*, 5 units)
This course is a study of microbial anatomy and physiology, classification, microbes in water, air, soil, food, sewage, and medical aspects of microbiology. It also includes the study of fundamental techniques in the growth, culture, and identification of microorganisms. Students are required to perform laboratory experiments to reinforce the principles of microbiology discussed in lecture. This course is designed for students planning to pursue careers in the health sciences or other life sciences.
- (8) Physiology 31 (*Human Physiology*, 4 units)
This course is a study of cellular physiology and the functional aspects of the following human body systems: circulatory, respiratory, digestive, excretory, reproductive, muscle, nervous and endocrine. In the laboratory, experiments are performed to demonstrate principles discussed in lecture. This course is designed primarily for those majoring in the Health Sciences.

b) Course Additions to Current Course Offerings

Our program offers two new courses: Biology 101 (Principles of Biology I) was added in Spring 2015. It is offered in spring and summer semesters each year, and Biology 102 (Principles of

Biology II) was added in Fall 2015. It is offered in the fall semester. These two courses are required for transfer and A.S. Biology major students.

c) Course Deletions and Inactivations from Current Course Offerings

Life Science program did not offer Biology 17 (Marine Biology) in 2015-2016 academic year. The program looks forward to offering Biology 17 and others like Biology 103 (Principles of Biology III) once we have a good pool of adjunct faculty.

d) Courses and Number of Sections Offered in Distance Education

Currently there are no hybrid or online courses offered in the Life Sciences at ECC Compton Center. The Life Sciences Program proposes to introduce the Biology, Anatomy, and Physiology hybrid courses to provide students with a robust and complete set of offerings. These offerings and continued modernization of the program will provide students the much needed support and workforce for the industry in the coming years and decades. The instructors at El Camino College Compton Center use the online course management system 'ETUDES' as an enhancement to their face-to-face classes. Technologies such as PowerPoint and video clips are used in our classrooms to increase the breadth and visual scope of lecture / lab materials and to provide various accommodations for the diverse learning styles of our students.

e) Are Courses, Degrees, or Certificates meeting students' transfer or career training needs?

In regard to the courses, degrees, or certificates and how well they are meeting students' transfer or career training needs:

1. Have all courses that are required for your program's degrees and certificates been offered during the last two years? If not, has the program established a course offering cycle?
All the courses listed above, that are required for an Associate in Science degree in Life Science, have been offered in the last two years. However, the number of course sections declined from 2010 to 2014 due to statewide budget cuts, while the fill rates continued to increase.
2. Are there any concerns regarding program courses and their articulation?
These courses are required for a 4-year degree on transfer to the CSU or UC institutions or Associate in Science degree. All the courses offered in the Life Science, discussed earlier, are UC and CSU transfer courses as advertised in the El Camino College, Compton Center 2015-2016 catalog.
3. How many students earn degrees and/or certificates in your program? Do students take licensure exams? If so, what is the pass rate? If few students receive degrees or certificates or if few students pass the licensure exam, should the program's criteria or courses be re-examined? Set an attainable, measurable goal for future degrees, certificates, and/or licensure pass rates.

The Life Science program provides courses (Essentials of Anatomy & Physiology, Anatomy, Biology, Microbiology, and Physiology) that prepare students for admission into Nursing / Allied Health disciplines. Many students also take these courses (e.g. General Biology and Marine Biology) to satisfy their general education requirements. Students who have completed courses offered in the Life Science have graduated with skills to go through training programs and function as Registered Nurses, Nursing Practitioners, Radiology Technicians, and Physician Assistants. Life Science program does not offer certificate or professional license. However, students have to transfer to four-year universities to complete their academic studies in various disciplines for bachelor's degrees or professional licenses.

f) List any related recommendations.

The need for advanced biotechnology training in the health care and industry to fulfill the federal science goals requires the program to keep pace with industry demands and up-to-date knowledge. In order to accomplish these goals, the program requires new laboratory equipment and laboratory spaces. Unfortunately, due to state funding restraints, funding is not commensurate with the growth we have been experiencing. The lack of expanded laboratory space has placed a limit on the number of courses that can be offered and thus the number of students that can be served to meet industry and university demands. The biological sciences program budget can no longer simply absorb the cost of buying laboratory materials, which include: dissection specimen, chemicals, modern equipment/technology, equipment maintenance and other consumables.

To improved retention and success rates, it is recommended that the program should strive towards smaller class sizes and more course sections for better interaction between students and instructors. Our labs were built for a maximum of 28 seats but the class limit has risen to between 36 and 40. It is our belief that a smaller class size would be more effectively managed by the instructors and will translate into a higher success rate than what we have now.

Hiring supplemental instructors (SI) would definitely be a great help to our students to support their academic performance and retention rate. The relatively lower success rates in anatomy and physiology may be improved by offering a combination of Anatomy and Physiology (34A and 34B). This course is UC and CSU transferrable and it is available at the ECC Torrance, and other colleges like the Riverside Community College, Riverside and Pasadena City College, Pasadena. This will give students an alternative route towards completing their courses.

Resuming the *Biology 103* and *Biology 17* courses is highly recommended for Health Science majors and of great demand among our students. Currently, there are no available hybrid/online courses regularly offered in the program. The program's future plan is to start one or two sections of hybrid/online Life Science classes that may enhance the course offerings. Finally, the Life Science program should continue to invest in faculty/staff development programs, technology and laboratory materials in order to provide the best quality of instruction and achieve the highest level of student success.

4. Assessment and Student and Program Learning Outcomes (SLOs & PLOs)

a) Alignment Grid which shows how course, program, and institutional learning outcomes are aligned

Institutional Learning Outcome (ILO) and Program Learning Outcome (PLO) Alignment Grid				
Program: Life Science		Number of Courses: 17	Date Updated: 03.21.2016	Submitted by: M. Priest, ext. 2314 Modified by Raj Sidhu
ILO's	1. Critical Thinking <i>Students apply critical, creative and analytical skills to identify and solve problems, analyze information, synthesize and evaluate ideas, and transform existing ideas into new forms.</i>	2. Communication <i>Students effectively communicate with and respond to varied audiences in written, spoken or signed, and artistic forms.</i>	3. Community and Personal Development <i>Students are productive and engaged members of society, demonstrating personal responsibility, and community and social awareness through their engagement in campus programs and services.</i>	4. Information Literacy <i>Students determine an information need and use various media and formats to develop a research strategy and locate, evaluate, document, and use information to accomplish a specific purpose. Students demonstrate an understanding of the legal, social, and ethical aspects related to information use.</i>
	SLO-PLO-ILO ALIGNMENT NOTES: <i>Mark boxes with an 'X' if: SLO/PLO is a major focus or an important part of the course/program; direct instruction or some direct instruction is provided; students are evaluated multiple times (and possibly in various ways) throughout the course or are evaluated on the concepts once or twice within the course.</i> <i>DO NOT mark with an 'X' if: SLO/PLO is a minor focus of the course/program and some instruction is given in the area but students are not formally evaluated on the concepts; or if the SLO/PLO is minimally or not at all part of the course/program.</i>			
PLO's	PLO to ILO Alignment <i>(Mark with an X)</i>			
	1	2	3	4
PLO #1 Language The student will understand and apply principles of the scientific method; recognizing an idea based on reproducible evidence.	X	X		X
PLO #2 Instruments The student will master the use of appropriate biological tools and evaluate evidence gathered to explain biological principles.				X
PLO #3 Structures Students will be able to use language and apply concepts learned to the life sciences.	X			X

**Program Learning Outcome (PLO) and Course Student Learning Outcome (SLO)
Alignment Grid**

SLO's	SLO to PLO Alignment <i>(Mark with an X)</i>			COURSE SLO to ILO Alignment <i>(Mark with an X)</i>			
	P1	P2	P3	1	2	3	4
ANAT 30 Essentials of Anatomy and Physiology: SLO #1 Language Students will be able to use language appropriate to anatomy and physiology and the health sciences.	X						
ANAT 30 Essentials of Anatomy and Physiology: SLO #2 Instruments Students will demonstrate the use of instruments for dissection, histology, and to gather data.		X		X	X		
ANAT 30 Essentials of Anatomy and Physiology: SLO #3 Structures Students will be able to identify higher vertebrate body structures, and explain the functions of body systems.			X				
ANAT 32 General Human Anatomy: SLO #1 Language Students will be able to use language appropriate to anatomy and the health sciences.	X						
ANAT 32 General Human Anatomy: SLO #2 Instruments Students will demonstrate the use of instruments for dissection, histology, and to gather data.		X		X	X		
ANAT 32 General Human Anatomy: SLO #3 Structures Students will be able to identify higher vertebrate body structures of all body systems.			X				
BIOL 10 Fundamentals of Biology: SLO #1 Scientific Method The student will understand and apply principles of the scientific method; recognizing an idea based on reproducible evidence.	X		X	X	X		X

BIOL 10 Fundamentals of Biology: SLO #2 Tools The student will be able to use the compound and dissecting microscope to observe cells and microorganisms.		X					
BIOL 10 Fundamentals of Biology: SLO #3 Content Knowledge (Mitosis) The student will be able to describe key activities in cell replication.			X				
BIOL 101 Principles of Biology I: SLO #1 Scientific Method The student will understand and apply principles of the scientific method; recognizing an idea based on reproducible evidence.	X		X				
BIOL 101 Principles of Biology I: SLO #2 Use of Microscope The student will be able to use the compound and dissecting microscope to observe cells and microorganisms.		X		X	X		X
BIOL 101 Principles of Biology I: SLO #3 Content Knowledge (Energy Flow) Students will use basic energy principles to explain the flow of energy in living systems, such as those that occur in the cellular metabolic pathways of photosynthesis and cell respiration, or the relationships observed between autotrophs and heterotrophs in ecosystems.			X				
BIOL 102 Principles of Biology II: SLO #1 Scientific Method The student will understand and apply principles of the scientific method; recognizing an idea based on reproducible evidence.	X		X				
BIOL 102 Principles of Biology II: SLO #2 Tools The student will be able to use the compound and dissecting microscope to observe cells and microorganisms.		X		X	X		X
BIOL 102 Principles of Biology II: SLO #3 Content Knowledge (Mitosis) The student will be able to describe key activities in cell replication.			X				

<p>BIOL 15 Environmental Aspects of Biology: SLO #1 Scientific Method The student will understand and apply principles of the scientific method; recognizing an idea based on reproducible evidence.</p>	X		X				
<p>BIOL 15 Environmental Aspects of Biology: SLO #2 Content Knowledge (Energy Flow) Students will use basic energy principles to explain the flow of energy in living systems, such as those that occur in the cellular metabolic pathways of photosynthesis and cell respiration, or the relationships observed between autotrophs and heterotrophs in ecosystems.</p>			X	X	X		X
<p>BIOL 15 Environmental Aspects of Biology: SLO #3 Content Knowledge (Materials Cycling) Students will describe how biologically significant materials move between the biotic and abiotic components of an ecosystem and the role living things play in the cycling of these nutrients.</p>			X				
<p>BIOL 17 Marine Biology: SLO #1 Scientific Method The student will understand and apply principles of the scientific method; recognizing an idea based on reproducible evidence.</p>	X	X					
<p>BIOL 17 Marine Biology: SLO #2 Content Knowledge (Energy Flow) Students will use basic energy principles to explain the flow of energy in living systems, such as those that occur in the cellular metabolic pathways of photosynthesis and cell respiration, or the relationships observed between autotrophs and heterotrophs in ecosystems.</p>			X	X	X		X
<p>BIOL 17 Marine Biology: SLO #3 Content Knowledge (Materials Cycling) Students will describe how biologically significant materials move between the biotic and abiotic components of an ecosystem and the role living things play in the cycling of these nutrients.</p>			X				
<p>MICR 33 General Microbiology: SLO #1 Language Students will be able to use language appropriate to microbiological studies and the health sciences.</p>	X			X	X		

MICR 33 General Microbiology: SLO #2 Instruments Students will demonstrate the use of instruments to gather data.		X					
MICR 33 General Microbiology: SLO #3 Microbes Student will be able to identify microbes and explain their roles in health and disease.			X				
PHYO 31 Human Physiology: SLO #1 Language Students will be able to use language appropriate to physiological functions and the health sciences.	X						
PHYO 31 Human Physiology: SLO #2 Instruments Students will demonstrate the use of instruments to gather physiological data.		X		X	X		
PHYO 31 Human Physiology: SLO #3 Mechanisms Students will be able to describe mechanisms and explain physiological processes that occur in the human body on cellular, organ, systemic, and organismal levels.			X				

b) Timeline for Course and Program Level SLO Assessments

COURSE SLO ASSESSMENT 4-YEAR TIMELINE REPORT					
Assessment Cycle	Course ID	Course Name	Course SLO	Title	Course SLO Statement
2013-14 (Spring 2014)	ANAT 30	<i>Essentials Anatomy/ Physiology</i>	SLO #3	Structures	Students will be able to identify higher vertebrate body structures, and explain the functions of body systems.
2013-14 (Spring 2014)	ANAT 32	<i>General Human Anatomy</i>	SLO #3	Structures	Students will be able to identify higher vertebrate body structures of all body systems.
2013-14 (Spring 2014)	MICR 33	<i>General Microbiology</i>	SLO #3	Microbes	Student will be able to identify microbes and explain their roles in health and disease.

2013-14 (Spring 2014)	BIOL 10	<i>Fundamentals of Biology</i>	SLO #1	Scientific Method	The student will understand and apply principles of the scientific method; recognizing an idea based on reproducible evidence.
2013-14 (Spring 2014)	BIOL 15	<i>Environmental Aspects of Biology</i>	SLO #1	Scientific Method	The student will understand and apply principles of the scientific method; recognizing an idea based on reproducible evidence.
2013-14 (Spring 2014)	BIOL 17	<i>Marine Biology</i>	SLO #1	Scientific Method	The student will understand and apply principles of the scientific method; recognizing an idea based on reproducible evidence.
2013-14 (Spring 2014)	PHYO 31	<i>Human Physiology</i>	SLO #3	Mechanisms	Students will be able to describe mechanisms and explain physiological processes that occur in the human body on cellular, organ, systemic, and organismal levels.
2015-16 (Spring 2016)	ANAT 30	<i>Essentials Anatomy/ Physiology</i>	SLO #1	Language	Students will be able to use language appropriate to anatomy and physiology and the health sciences.
2015-16 (Spring 2016)	ANAT 32	<i>General Human Anatomy</i>	SLO #1	Language	Students will be able to use language appropriate to anatomy and the health sciences.
2015-16 (Spring 2016)	MICR 33	<i>General Microbiology</i>	SLO #1	Language	Students will be able to use language appropriate to microbiological studies and the health sciences.
2015-16 (Spring 2016)	PHYO 31	<i>Human Physiology</i>	SLO #1	Language	Students will be able to use language appropriate to physiological functions and the health sciences.
2015-16 (Spring 2016)	BIOL 10	<i>Fundamentals of Biology</i>	SLO #2	Tools	The student will be able to use the compound and dissecting microscope to observe cells and microorganisms.

2015-16 (Spring 2016)	BIOL 101	<i>Principles of Biology I</i>	SLO #1	Scientific Method	The student will understand and apply principles of the scientific method; recognizing an idea based on reproducible evidence.
2015-16 (Spring 2016)	BIOL 101	<i>Principles of Biology I</i>	SLO #2	Use of Microscope	The student will be able to use the compound and dissecting microscope to observe cells and microorganisms.
2015-16 (Spring 2016)	BIOL 101	<i>Principles of Biology I</i>	SLO #3	Content Knowledge (Energy Flow)	Students will use basic energy principles to explain the flow of energy in living systems, such as those that occur in the cellular metabolic pathways of photosynthesis and cell respiration, or the relationships observed between autotrophs and heterotrophs in ecosystems.
2015-16 (Spring 2016)	BIOL 15	<i>Environmental Aspects of Biology</i>	SLO #3	Content Knowledge (Materials Cycling)	Students will describe how biologically significant materials move between the biotic and abiotic components of an ecosystem and the role living things play in the cycling of these nutrients.
2016-17 (Fall 2016)	BIOL 102	<i>Principles of Biology II</i>	SLO #1	Scientific Method	The student will understand and apply principles of the scientific method; recognizing an idea based on reproducible evidence.
2016-17 (Fall 2016)	BIOL 102	<i>Principles of Biology II</i>	SLO #2	Tools	The student will be able to use the compound and dissecting microscope to observe cells and microorganisms.
2016-17 (Fall 2016)	BIOL 102	<i>Principles of Biology II</i>	SLO #3	Content Knowledge (Mitosis)	The student will be able to describe key activities in cell replication.

2016-17 (Spring 2017)	ANAT 30	<i>Essentials Anatomy/ Physiology</i>	SLO #2	Instruments	Students will demonstrate the use of instruments for dissection, histology, and to gather data.
2016-17 (Spring 2017)	ANAT 32	<i>General Human Anatomy</i>	SLO #2	Instruments	Students will demonstrate the use of instruments for dissection, histology, and to gather data.
2016-17 (Spring 2017)	MICR 33	<i>General Microbiology</i>	SLO #2	Instruments	Students will demonstrate the use of instruments to gather data.
2016-17 (Spring 2017)	PHYO 31	<i>Human Physiology</i>	SLO #2	Instruments	Students will demonstrate the use of instruments to gather physiological data.
2016-17 (Spring 2017)	BIOL 10	<i>Fundamentals of Biology</i>	SLO #3	Content Knowledge (Mitosis)	The student will be able to describe key activities at each stage of mitosis.
2016-17 (Spring 2017)	BIOL 15	<i>Environmental Aspects of Biology</i>	SLO #2	Content Knowledge (Energy Flow)	Students will use basic energy principles to explain the flow of energy in living systems, such as those that occur in the cellular metabolic pathways of photosynthesis and cell respiration, or the relationships observed between autotrophs and heterotrophs in ecosystems.
2016-17 (Spring 2017)	BIOL 17	<i>Marine Biology</i>	SLO #2	Content Knowledge (Energy Flow)	Students will use basic energy principles to explain the flow of energy in living systems, such as those that occur in the cellular metabolic pathways of photosynthesis and cell respiration, or the relationships observed between autotrophs and heterotrophs in ecosystems.
2017-18 (Fall 2017)	BIOL 17	<i>Marine Biology</i>	SLO #3	Content Knowledge	Students will describe how biologically significant materials move between

					the biotic and abiotic components of an ecosystem and the role living things play in the cycling of these nutrients.
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PLO ASSESSMENT 4-YEAR TIMELINE REPORT			
Assessment Cycle	Unit Name	PLO Name	Course PLO Statement
2013-14 (Spring 2014)	Life Science: (Anatomy, Biology, Physiology, Microbiology)	PLO #3 Application of Health Science Concepts	Students will be able to apply concepts learned to healthy and pathological outcomes.
2014-15 (Spring 2015)	Life Science: (Anatomy, Biology, Physiology, Microbiology)	PLO #1 Scientific Method	The student will understand and apply principles of the scientific method; recognizing an idea based on reproducible evidence.
2015-16 (Spring 2016)	Life Science: (Anatomy, Biology, Physiology, Microbiology)	PLO #2 Biological Methods	The student will master the use of appropriate biological tools and evaluate evidence gathered to explain biological principles.
2016-17 (Spring 2017)	Life Science: (Anatomy, Biology, Physiology, Microbiology)	PLO #3 Language and Concepts	Students will be able to use language and apply concepts learned to the life sciences.
2017-18 (Spring 2018)	Life Science: (Anatomy, Biology, Physiology, Microbiology)	PLO #1 Scientific Method	The student will understand and apply principles of the scientific method; recognizing an idea based on reproducible evidence.

c) Percent of Course and Program SLO Statements that have been Assessed

For both the course and program level SLO statements, the percent that have been assessed from Fall 2011 to Fall 2016 is 66.7%. However, most of the assessments that have not been completed during that time period are due to be assessed in 2017. Moreover, certain courses with a low percentage of assessed SLO statements such as Biology 17: (Marine Biology) and Biology 15: (Environmental Aspects of Biology) are only offered intermittently. Finally, our program has implemented better practices to encourage part-time faculty to complete their SLO assessments in a timely manner including assigning a full-time faculty member as the lead faculty to oversee the data collection, interpretation, and submission into the TracDat system.

d) Summarization of the SLO and PLO Assessment Results

SLO assessments completed in Life Sciences gave valuable information which is helping faculty to:

1. Understand how to better facilitate student learning.
2. Determine what's working and what's not working in their courses or program.
3. Select the appropriate teaching strategy.
4. Prioritize the need for equipment and technology to improve instructions.
5. Help students to explain what they can do and what they know.

As a result of SLO assessments and reports, the faculty is continuously updating their pedagogy, acquiring new strategies, and improving student/professor relationships. On the average, 75% of our students succeed in the individual SLO assessments conducted. The Life Science program assessed and completed 100% of the SLO reports that are due in spring 2016. We strongly believe that inadequate student preparation in reading skills, requisite background knowledge, time management skills, and taking too many classes in a semester contributes to their lack of success.

e) Improvement of SLO Process and Dialogue about Assessment Results

Each course is assigned to a full time faculty coordinator, who is responsible to discuss SLO tools, rubrics, results, and then find ways to further improve the outcomes. Each instructor provides their results and gives input on how the course /program as a whole can be improved. It is common knowledge that many of our students become overwhelmed and frustrated by mid-semester because of the amount of material that has to be covered in each of our courses. It is recommended that assessments are done close to the time the material was taught to have a good idea if students actually understood the materials when taught. If time permits, we may conduct another assessment any other time before the end of the semester.

f) Findings from SLO/PLO Assessments

The plan is to spend more time on each topic covered in and out of the classroom to reinforce the lessons and activities. Thus, we need tutoring, supplemental instruction, and open labs for students in the program. Proper student academic program planning by the Counseling Program will ensure that students who need to, take classes that teach reading and study skills before enrolling in Life Science classes. We also have requested projection microscopes for instructors

and student microscopes with pointers. We strongly believe that inadequate student preparation in reading skills, requisite background knowledge, time management skills, and taking too many classes in a semester contributes to their lack of success.

g) List any related recommendations.

1. All sections of a course should have same/similar SLO assessment tool, rubric and faculty should endeavor to complete within a mutually agreed time frame.
2. The data should be forwarded to the course coordinator as soon as possible.
3. It should be followed by a thorough discussion of results by the faculty to suggest any changes in teaching strategies to improve the results.
4. Tutoring should be available for all students.
5. SI coaches should be assigned to sections reporting problems with success and retention.
6. Every effort should be made that weekly lab schedule be uniform in all sections of a course.
7. Lab scheduling should be well aligned with lectures as they augment understanding of subject matter discussed in lecture.

5. Analysis of Student Feedback

This survey gathers the perspectives of Compton Center students in Life Science program during the Fall 2015 semester. Responses were sought on several issues that influence student satisfaction, such as the classroom environment, quality of instructors, courses offered and their availability, and the quality and availability of facilities.

The number (N) of students surveyed was 149. Not all the students responded to all the 15 statements in the survey. Areas covered were:

- Student Support
- Curriculum
- Facilities, Equipment, and Technology
- Program Objectives

a) Description of the Results of the Student Survey

The survey results for each aspect/statement as indicated before, are presented at the end of this write up but are summarized below under the four areas.

i. Student Support

As evident from the table below, students view the instructors in Natural Sciences Program very favorably. The majority of students also appreciate the sense of community within the program, and feel that their contributions are appreciated. However, a good number of students are neutral on these two aspects. As all of the students at a community college are commuters and return home after their classes are done for the day, it can be particularly challenging for them to develop a sense of community.

Student Support		Scale	1	2	3	4	5	--	--
		Frequency	Strongly Agree	Agree	Neither Agree or Disagree	Disagree	Strongly Disagree	Missing	Mean
1	Instructors in this program have helped me achieve my academic goals	67	64	13	3	0	2	1.67	
2	Instructors in this program have helped me stay on track.	73	62	10	3	0	1	1.61	
3	Instructors in this program provide opportunities to actively participate in my classes.	73	62	8	2	0	4	1.58	
4	I have felt a sense of community within this program.	54	69	24	1	0	1	1.81	
5	Student contributions have been valued by instructors in this program.	61	64	21	0	0	3	1.73	

ii. Curriculum

The feedback from the survey is positive. The only exceptions are regarding the variety of extracurricular activities available and adequacy of library resources, which may need some improvement.

Curriculum		Scale	1	2	3	4	5		
		Frequency	Strongly Agree	Agree	Neither Agree or Disagree	Disagree	Strongly Disagree	Missing	Mean
1	There is an appropriate range of courses offered in this program.	61	73	8	6	0	1	1.72	
2	Courses were scheduled on days and times that were convenient to me.	64	68	14	2	0	1	1.69	
3	I've been able to register for the classes I need within this program.	72	63	6	7	0	1	1.65	
4	The courses in this program have helped me meet my academic goals.	67	69	10	1	0	2	1.63	
5	There is a variety of extracurricular activities related to this program on campus.	32	44	58	9	3	3	2.36	
6	The library has the resources to help me succeed in this program.	46	49	49	4	0	1	2.07	

iii. Facilities, Equipment, and Technology

Even though two-thirds of the students have positive feedback on the available facilities, equipment and technology, one third of the students think otherwise. Our faculty are working with maintenance staff to improve the cleanliness of the building and improve issues with facilities.

Facilities, Equipment, & Technology		Scale	1	2	3	4	5		
		Percent	Strongly Agree	Agree	Neither Agree or Disagree	Disagree	Strongly Disagree	Missing	Mean
	The buildings and classrooms used by this program are satisfactory.	30	70	21	23	2	3	2.29	
	I am satisfied with the equipment (projectors, machinery, models, etc.) used in this program.	39	65	29	12	2	2	2.14	
	I am satisfied with the computers and software used in this program.	37	62	43	4	1	2	2.12	

iv. Program Objectives

The survey results on the program objectives are positive.

Program Objectives	Scale	1	2	3	4	5		
	Percent	Strongly Agree	Agree	Neither Agree or Disagree	Disagree	Strongly Disagree	Missing	Mean
I am aware of the course outcomes - what I should be able to learn and what skills I should possess after completing courses in the program.	73	70	3	0	0	3		1.52

b) Implications of the Survey Results for the Program

In general, most of the survey results are very positive. Most students appreciate the sense of community within the program, and feel that their contribution are appreciated. However, about 15% of students do not have positive feedback and are neutral on these two aspects. The variety of extracurricular activities available and adequacy of library resources did not elicit positive feedback from a significant number of students and will need some improvement. One third of the students had a neutral or negative feedback on availability and adequacy of facilities, equipment and technology in the program.

c) Results of Other Relevant Surveys

No other relevant surveys available.

d) List any Related Recommendations

To develop a sense of community and appreciation of their contributions, all the students should be encouraged to take part in class and extracurricular activities and their success should be praised regularly. About 50% of students feel that the extracurricular activities related to the program are inadequate. Students may be too busy working and may have very little spare time or only a little time in between classes to know what actually exists on campus. Facilities should be provided for small group/short time extracurricular activities.

About 30% of students considered the Library resources inadequate. It is recommended that the library should have at least three (3) sets of text books and Lab manuals available to help students who cannot afford to buy them. The Library should subscribe and provide students free access to online/hard copy science and other relevant journals. A third of the students surveyed considered facilities, equipment, and technology inadequate. These need to be assessed in detail and improvements should be made where essential. Some of the immediate attention needed in our facilities, equipment and technology the Math Science building air conditioning, maintenance of clean class rooms and bath rooms, availability of models, specimens, at least two microscopes with attached cameras, and relevant software in the labs.

6. Facilities and Equipment

a) Description and Assessment of the Existing Program Facilities and Equipment

Facilities

In the Life Science program, the facilities and equipment are just adequate for the current size of the program, but in need of improvements and expansion to support increase in enrollment in the program. Due to limited availability of classrooms, the growth of the program through adding introduction of additional sections or new courses is limited. Our classes are scheduled back to back Monday through Friday and in the morning, afternoon, and evening. Currently, there are 6 classrooms which are dedicated to Biology (MS 108), Anatomy (MS 105, 110, and 128), Physiology (MS 103), and Microbiology (107). Furthermore, the scheduling of additional anatomy, physiology, and microbiology is difficult with current laboratory space, so adding more laboratory space is critical for expansion. The program also has two laboratory preparation areas (MS 109 and 106) which is are configured as biology and microbiology preparation rooms besides serving as storage space for anatomy and physiology materials. A highly functional cold room (MS 104) serves to preserve dissection animals and organs.

Equipment

Recently, the program purchased 80 new microscopes for Microbiology and Biology classrooms. The previous microscopes were repaired and placed in the Anatomy and Physiology classrooms. Physiology increased the amount of BIOPAC units from four to seven and additional units of models have been added for the Anatomy and Biology classes. The addition of comfortable and laboratory chairs has facilitated learning in the classroom.

b) Immediate (1-2 years) Needs Related to Facilities and Equipment

The immediate need of the Life Science program is the regular maintenance of its equipment and facilities. We need every one of our resources to function all the time and continue to support the vast amount of instruction going on in the program. Any loss or damage to our equipment or facilities will negatively impact the program. The Life Science program will not be able to keep the enrollment and success numbers because what we have now is just adequate. There are no backup equipment, models, and even space. Regular janitorial service for the classrooms, bathrooms, and offices is much needed. Faculty members work tirelessly to retain students beyond one semester in the program but many first time students have expressed disappointment over the aesthetic value of the Math Science building, inside and outside. An alarm system in the cold room (MS 104) that can sound when the door is not closed properly or the temperature changes quickly, will help to properly preserve the dissection specimens.

c) Long-range (3-4 years) Needs Related to Facilities and Equipment

Our planning will continue to focus on the educational needs of students. The health care industry is projecting a shortage of qualified personnel needed to care for an aging population and also that the older of current healthcare workers are retiring. There is a greater demand for healthcare-related services; therefore, our program needs to anticipate more students entering health and science careers. Our program can invest in higher quality, more efficient facilities both lecture and laboratory settings. MS 105 and 128 need to be restructured to accommodate

both lecture and lab classes. Additional space for classrooms is needed to maximize the sections offered and allow. Additionally, the seating arrangement in the Anatomy lab (MS 110) needs to be reconfigured so that all students face the instructor and the board in the front of the classroom. A more modular configuration in which laboratory benches are on wheels and can be rearranged may provide the ultimate flexibility to transition from lecture where students face the instructor to group work in which students turn their laboratory benches to face their fellow students.

d) List any Related Recommendations (short and long term)

Retro-fitting of existing classrooms & labs for gas supply is vital to providing a safe, efficient place for students to learn. The Life Science program proposes facility repairs or modifications for the coming years. Our needs regarding facilities and equipment are listed in Prioritized recommendations on facilities & miscellaneous table, which requires \$120,500.00 and includes chemicals, models, and equipment cost.

Concerning the adequacy and currency of facilities & equipment, the department recommends to the repair of electrical outlets on MS 103, 105, 107, 108, 128, and 110. The floors have electric outlets with plastic covers where a few areas are not safe to walk. Additionally, the fume hoods in MS 106 and 108 need to be repaired as it is a safety issue. The building and the classrooms used by the program are rated by our students as satisfactory. 20.13% of the respondents strongly agreed, 46.98% agreed, and 14.09% neither agreed nor disagreed with the statement. Also, the data collected on students' satisfaction with the equipment used in the program showed 26.17% strongly agreed, 43.62% agreed, while 19.46% neither agreed nor disagreed.

The immediate (1-2 years) needs related to the facilities and equipment:

- i. Repair of plumbing and electrical lines in the classrooms to keep safe for students, faculty, and staff safe.
- ii. Annual servicing of microscopes, fume hoods, and the autoclave are very important so that students, faculty, and staff have access to properly functioning equipment in the laboratory. In particular, the microscopes in the Anatomy lab (MS 110) need pointers added to the eyepiece so that Instructors can more effectively convey to students which structure(s) on a given slide to focus on.
- iii. Waste disposal of used reagents and dissection specimens needs to be regularly scheduled for the waste to be safely discarded. The use of these materials ensures that students get adequate hands on training with live cultures or actual specimens to dissect for a deeper understanding of the materials.
- iv. The Annual Natural Science Student Research Symposium is an important means to showcase the learning that is taking place within our program. Student-led research is a proven high impact learning method for students. Funding for reagents and supplies for the research as well as awards and refreshments for the ceremony are thus requested.
- v. Many of the door stops are nonfunctional and faculty prop open doors by placing a desk or chair in the doorway, which partially blocks the exit and poses a hazard in the event of an emergency escape. Additionally, the doors in the back of classrooms MS 108 and MS 110 are not able to be locked from the inside, which is a safety hazard in the event of a danger outside of the classroom such as an active shooter or some other human threat.

Long-range (2-4 years) needs related to the facilities and equipment

At least two extra laboratory and classroom spaces are needed to facilitate a more relaxed scheduling of our classes and to increase enrollment in all courses taught in the program. The total cost estimate depends the number of spaces structured. The program expansion will take place only with additional spaces so as to increase the number of those courses. Finally, a human cadaver would be more relevant than cats for dissection, particularly for students that are interested in pursuing health care careers.

Prioritized recommendations on facilities & miscellaneous

Categories	Items	Costs	Position
Facilities I	Repair of electrical, gas, and plumbing issues 11 rooms	\$40,000	1
Miscellaneous I	Microscope repair, parts, and service	\$9,500/yr.	1
Miscellaneous II	Autoclave repair and service contract	\$10,000	2
Miscellaneous III	Purchasing consumable reagents and dissection specimens (cats, brain, eyes, hearts)	\$15,000	2
Miscellaneous IV	Waste disposal fees (dissection specimens and chemicals disposal)	\$3,000/yr.	2
Educational	Providing funds for Natural Sciences Student Research Symposium	\$4,000/yr.	2
Facility II	Providing doors with appropriate stoppers, wedges, and inside lock system	\$10,000	3
Facility III	Retro-fitting of existing prep rooms with gas supply	\$20,000	4
Facility IV	Installing alarm system for cold room door (MS 104)	\$1,000	4
Facility V	Repair and certification of fume hood (MS 109)	\$1,500/yr.	5
Miscellaneous V	Purchase human cadaver, gurney, and related supplies	\$6,500	6
Total		\$120,500	

7. Technology and Software

a) Description and Assessment of the Existing Program Facilities and Equipment

The classrooms in Life Science program were recently upgraded with audio-visual (AV) technology system that includes projectors, screens, computers, with windows 10 and Utology software login setup. In human physiology lab, BIOPAK software has been installed on several laptops to be used to conduct laboratory exercises on muscle, brain, heart, and lung functions during lab activities.

The availability of campus-wide Wi-Fi technology is a great provision that allows instructors and students access to the Internet at anytime and anywhere on campus, especially in the classroom for both lecture and lab activities. The availability of the Wi-Fi service on campus has opened limitless academic resources and possibility to incorporate technology that promote students' ownership of knowledge and increased responsibility for their learning

b) Immediate (1-2 years) Needs Related to Technology and Software

Taking into consideration that there has been a drop in the overall college enrollment, we suggest improving infrastructure and technology to attract and sustain student enrollment. Using technology and hands-on training in Life Science program would enhance the employment and career opportunities for our students. Advanced technology could be incorporated by using interactive audiovisual assistants such as:

1. ECG machine

Approximate cost: \$2000 for the machine

Recording paper \$5/pack

Maintenance \$100/each repair

2. Desktop Spirometer

Approximate cost: \$2000 for the machine

Recording paper \$5/pack

Maintenance \$100/each repair

3. EEG machine with Bluetooth function (40 individual machine, \$50 each) the portable device can measure Glucose meter, Thermometer, Urine analyzer, scale, etc.

4. Digital Professional Trinocular Compound Microscope 40X with camera connection to the AV system

Approximate cost: \$3000

Maintenance /extended warrantee \$600

5. Procuring access to Lynda.com for faculty and staff. This is a website that teaches the

latest software, creative, and business skills through high-quality online instructional videos featuring recognized industry experts.

c) Long-range (2-4+ years) Needs Related to Technology and Software

Our planning continues to focus on industry and educational needs of students. One way to attract and increase student enrollment is using computers in classrooms. Providing laptops for students in the classroom for examination, laboratory exercises, survey, and practice in classroom, not only would save time, efforts, and costs compared to the traditional non-computer classroom settings, and promote quality education among our students.

1. Each classroom would need about 40 laptops (Approximate cost \$600/each)
2. Laptop Software:
 - Online examination, survey, evaluation that is linked to Canvas (our course management system)
 - Essential Anatomy 5 (\$25)
 - Sobotta atlas (\$70)
 - Skeletal system -3D atlas of anatomy (\$10)
 - Free apps for brain and other organs/systems lab activities
3. Offering hybrid classes that incorporate both the traditional classroom and online education would benefit a vast majority of our students who have limited availability for onsite classes.

d) List any Related Recommendations

New technology and its applications in science and in the classroom in particular have revolutionized every aspect of the teaching/learning process. The use of audiovisual-based technology in the classroom not only promotes active learning in the classroom, but also enhances students' attentions, understanding, retaining and applying the course materials. To better prepare college students of the 21st century, the science education reforms recommended that science teachers should integrate technology and inquiry-based teaching into their instruction (American Association for the Advancement of Science, 1993; National Research Council [NRC], 1996, 2000). Health science majors would benefit tremendously from hands on practice using medical devices alongside BIOPAK software that teaches the basics underlying the medical devices.

The purchasing and installation of high tech hardware and software in classrooms could be financially costly, but in the long term it is money well spent economically and environmentally. For example, using the laptops for online examination/surveying to replace

the traditional hard copies is convenient and would cut extensive costs of papers, printing, labor, and most importantly has environmental benefits to save our ecosystem and cut our ecological footprint. As an academic institute, we have the responsibility to lead by example and save our ecosystem. Even with a single computer connected to a projector screen, an Internet connection and a microscope, instructors can demonstrate the histology and microbiology slides as resources for engaging students and helping them learn science concepts. In short, the search for up-to-date affordable technology and equipment in science should be continued as well as providing the essential training for faculty to better serve their students and provide quality education.

8. Staffing

a) Current Staffing

The Life Sciences program has eight full-time faculty members and six part-time faculty members. All faculty members of the program are well-qualified and have advanced degrees. There has been considerable transition among the faculty over the past 3 years with the promotion of some members and the resigning of others. Four of the full-time faculty members were hired within the last 2 years. The hiring of the three new full-time Anatomy/Physiology Instructors in Fall of 2016 was essential as enrollment in anatomy and physiology courses in particular has been increasing since 2013 (see Program Participation section). Moreover, only 33% of the Anatomy 30: Essentials of Anatomy/Physiology sections and 45% of the Anatomy 32: General Human Anatomy were taught by full-time faculty during the Fall 2015 semester, in contrast with 60-100% of sections that were taught by full-time faculty for the other courses offered in the program.

Our program was able to increase the ratio of full-time to part-time faculty ~~that our~~ teaching these in-demand courses to retain students and help them succeed. The program has two full-time laboratory technicians who are responsible for ordering supplies, preparing the materials, and setting up the labs. Our program also has one hourly student worker to assist our laboratory technicians. A limited number of courses in the program have Supplemental Instruction (SI) coaches including Biology 10, but there is no dedicated tutor available for all of the courses in the Life Science program. The Life Sciences program is part of Division 1 overseen by one division chair and one dean.

b) Program's Immediate (1-2 years) and Long-range (2-4+ years) Staffing Needs

The program's most immediate need is for dedicated tutors and additional Supplemental Instruction (SI) coaches to cover more courses. Academic support services like tutoring and supplemental instruction are a well-established means of improving success, retention, and persistence. Additionally, tutors and SI coaches can close the equity gap for underprepared students. SI coaches in particular are trained to provide students with study skills and develop their sense of self-efficacy. The associated salary cost of hiring tutors or SI coaches for 20 hours/week to be available during various times of the day as well as the evening would be \$10,000-\$13,500 per year.

c) Related Recommendations

Tutors and SI coaches need to be hired for 20 hours/week to improve student success rates. Additional staff and faculty hires in the next 2-5 years will be dependent on the FTES generated by the program.

9. Future Direction and Vision

a) Relevant Changes within the Field

The Comprehensive Master Plan as well as the Strategic Initiatives (SI) continue to be our guide as we look into the future. Our main focus is better instruction and student support for improved student retention and success. The faculty pledge to continue to improve themselves through student and faculty assessment, training, and planning. Our faculty will remain committed to our relationship with our colleagues at Compton Educational Center and the faculty at El Camino College in Torrance, CA, as well as administration and the community we serve to improve society through technology and sustainability practices.

Advances in biotechnology, needs in the health care industry, and the federal science goals require the program to keep pace with industry demands. In order to accomplish this goal, the program will focus on continued updates to lecture/laboratory equipment and laboratory spaces. Our lack of expanded laboratory space places a limit on the number of course sections that were offered and limited the number of students that could be educated to meet industry and university demand.

b) Explanation and Plan

We hope that the Life Science budget will be increased considerably since the program generates a relatively higher number of FTES than many other campus programs. Every semester, students who want to add courses in our program are turned away due to a lack of seat availability. Our program particularly needs to add additional sections of Anatomy 32: General Human Anatomy and other courses as needed. New courses that can be offered to meet the needs of students who are pursuing degrees or careers in the field of biotechnology include Molecular Biology and Human Genetics. Additionally, our program needs to add to and increase our offering of online and hybrid courses. Not only would online and hybrid courses increase classroom availability so that our program could increase our course offerings, but these types of courses would also be more appealing to students who are seeking a more flexible schedule. This continued modernization of our program will prepare students for industry demands and provide students with the skills they will need to be competitive in the workforce for the coming years and decades. We very strongly believe that the Life Science Program will continue to grow and that student enrollment will continue to increase. The faculty members are dynamic, knowledgeable, and capable of educating the future professionals and citizens of our society.

c) Related Recommendations

Our program needs expanded and more collaborative laboratory spaces to accommodate additional course offerings. Additionally, our program needs to develop more online and hybrid course offerings which could potentially increase our FTES by attracting more students who are seeking a flexible schedule. These online and hybrid courses are expected to not only increase enrollment because of their appeal to students, but would also free up classroom space to accommodate more section offerings.

10. Prioritized recommendations

a) List of Recommendations

Recommendations	Cost Estimate	Strategic Initiatives
1. Repair electrical, gas, and plumbing issues (11 rooms)	\$40,000	F
2. Microscope repair, parts, and service	\$9,500/yr	A, F
3. Purchase dissection specimens and other consumables	\$15,000	A, B, C
4. Hazardous waste disposal (e.g. dissected specimens)	\$3,000/yr	A, B, C
5. Autoclave repair and service contract	\$10,000	A, F
6. Hire tutors and SI coaches	\$10,000- \$13,500/yr	A, B, C
7. Fund Annual Student Research Symposium	\$4,000/yr	A, B, C
8. Purchase microscope with camera connection to AV system	\$3,600	A, F
9. Repair door stoppings and locks	\$10,000	F
10. Install alarm system for cold room door (MS 104)	\$1,000	F
11. Retrofitting of prep labs with gas availability	\$20,000	F
12. Purchase 40 iPads/laptops plus software for student use	\$25,000	A, B
13. Repair and annual certification of fume hood (MS 109)	\$1,500/yr	F
14. ECG machine, EEG machine, Document camera, and Spirometer	\$7,000	A, C, F
15. Purchase human cadaver, gurney, and related supplies	\$6,500	A, C

b) Explanation of Prioritization

The repair of electrical, gas, and plumbing issues is a safety issue for students, staff, and faculty and needs to be addressed immediately. The priorities were chosen based on their impact and the number of students who would potentially benefit. Microscopes need to be routinely serviced and repaired for optimal instruction as they are very heavily used in every Life Science course. Having facilities and equipment in good, working order conveys to students that our program is delivering a worthwhile, high quality educational experience which will potentially help our program retain a higher percentage of students. The courses in our program depend on dissection specimens to provide students, many of whom are oriented towards careers in the health sciences, with hands on experience studying various tissues and organ systems. Likewise, the cost to dispose of hazardous materials generated during laboratory exercises is necessary to provide students with authentic, hands on laboratory experiences. The dissection specimens primarily benefit students who are taking Anatomy or Physiology.

A properly functioning autoclave is essential to preparing sterile materials and reagents for our courses, particularly Microbiology. The availability of tutors and SI coaches is a well-established way to improve success and retention within a program. Although only a small subset of students in the Life Science program present their research at the Annual Student Research Symposium,

many students attend and learn from their peers. A dedicated microscope with a camera that could be set up to the A/V system would be helpful for Instructors to guide students to certain features of the specimen on the microscope slide, particularly for Anatomy students. Repairing the door stoppings and ensuring that all doors can be locked from the inside is a safety issue that needs to be addressed. Installing an alarm system for the cold room door (MS 104) and retrofitting existing laboratory prep rooms with gas availability are equal priorities as they would enhance the functionality of our facilities. Laptops could potentially support learning by giving students access to information and software while they are in the classroom. The nonfunctioning fume hood in MS 106 and 108 could be repaired and maintained so that it can be used by students, particularly in Biology and Microbiology. Buying an ECG machine, EEG machine and Spirometer is an equal priority with purchasing a human cadaver, gurney, and related supplies. Both of these two priorities would equip our Anatomy and Physiology labs with state-of-the-art equipment bring a higher level of relevance to the learning.