The Program Review Process

Program review ensures that the college’s academic programs are effective and responsive to students and the local community within the limitations of available resources. The review process includes the systematic collection, analysis and interpretation of relevant data, an assessment of progress made in achieving student learning outcomes, the fulfillment of program needs, and the accomplishment of program objectives and goals.

Academic program review is an integral part of educational planning, supports the Enrollment Management Plan, and enables the college to meet the accreditation standards of the Accreditation Commission for Community and Junior College (ACCJC).

The major objective of program review at Feather River College is to guide the development of the Education Plan. Essential items within program reviews include the following:

1. Collect and analyze accurate and complete data on key performance indicators, student learning outcomes, program activities, and accomplishments.
2. Ascertain and document program weaknesses and strengths.
3. Develop program objectives and goals.
4. Justify program budget requests.
5. Comply with Federal and State law, Title 5, Student Equity, VTEA, matriculation (including prerequisite and co-requisite standards), ADA (American with Disabilities Act), and other legal or certification requirements.

**Academic Program Link to College Mission**

Feather River College provides high-quality, comprehensive student learning and education and workforce preparation in a small college environment. The College provides general education, Associate’s Degrees, transfer programs, and life-long learning for a diverse student population. The College serves as a community, cultural, and economic leader encompassing all communities that lie within the District and embraces the opportunities afforded by its natural setting.

**[Biology (including Anatomy and Physiology)] Program Review**

###### Connection to Mission

1. Briefly describe your program objective(s) and how the program supports and furthers the College’s mission.

The objectives of the Biology Program are to meet the needs of students as follows:

Biology is a very broad discipline. At Feather River College (FRC) the students taking classes in the Biology Program tend to fall into three categories:

1. Students planning to transfer to a four-year university in a biology-related discipline including the new vocational Bachelor’s in Equine and Ranch Management,
2. Students planning a career in the medical field, most commonly nursing, and
3. Students taking Biology to satisfy the general education science with lab requirement.

Feather River College is a very small, but since the Biology (BIOL) Program tries to accommodate the needs of all three groups, and Feather River College supports programs and courses in biology-related fields such as Environmental Studies, Equine Studies, Nursing, Agriculture, and Anthropology, any student can actually tailor their biology-related coursework in a highly individual manner.

1. Describe how your program’s curriculum and instruction connect with the program objectives (see Appendix G-2: Data Sets for supporting information).

Below are the options for students with respect to Biology:

Biology Majors

* transfer to a four-year institution
* completion of AA or AS Biology/other life science discipline degree requirements

Nursing Majors

* completion of biology requirements for students in a nursing program
* acceptance into a nursing program: RN or Bachelors of Science in Nursing
* accomplishment of the Registered Nurse step up

Health and Exercise Studies Majors

* completion of requirements for major/transfer/FRC degree

Agriculture Majors

* completion of requirements for major/transfer/FRC degree
* completion of requirements for the Vocational Bachelor’s degree in Equine and Ranch Management

Environmental Science

* completion of requirements for major/transfer/FRC degree

Other life sciences areas that are not under a specific program (Anthropology etc.)

* completion of requirements for major/transfer/FRC degree

The Biology Program has offered 10 courses in the past and since 2014 has offered 8 courses on a regular basis (at least once in an academic year) (Table 7). Since 2010, the Biology Program has offered at least 16 sections per academic year and 24 sections per academic year since 2014 (Table 8). Typically, 3% of FRC students take courses in Biology per academic year ((Tabl32) and the program has generated 85.88 FTES on average since 2010 but in the last 3 academic years FTES has averaged at 80.8 (Table 1; Figure 1). Though overall FTES appears to have dropped in the program, the % FTES vs. all FTES generated at FRC has held fairly steady with an average of 4.55 % indicating that the drop in FTES for the last 3 academic years is a campus-wide trend and not indicative of systemic problems within biology (Table 2, Figure 2). As currently all courses offered in Biology also include a lab, all on-campus courses are taught in Sci 104 which has a room capacity of 24 students yet average enrollment per section in Biology is 25 with the average enrollment per section varying between 19.3 to 31.9 students (Table 9) indicating that students are utilizing the program offerings in Biology somewhat more or less to capacity depending on the section/academic year.

BIOL 164, Animal Behavior has not been offered recently as it is no longer needed for transfer in Agriculture for universities our students typically transfer to such as Cal Poly San Luis Obispo. The Independent Study option in Biology is rarely feasible because nearly all Biology courses include a lab which is difficult to provide outside the regular biology curriculum. BIOL 120/ENVR 120 was left out of this discussion as it is discussed in the ENVR CPR.

###### B. Program Curriculum, Instruction & SLO Assessment

1. What are the Program-level Student Learning Outcomes (PSLOs) for the degrees and certificates in your program? (see also Appendix G-1: SLO Assessment Forms from Prior Years).
2. Respondents will be able to apply the biological concepts of structure and function, organization, cellular processes, genetics as well as ecology and evolution at all levels (molecular, cellular and organismal) and across the lineages of the tree of life.
3. Respondents will be able to compare and contrast features of living systems with respect to their common evolutionary origin as well as with respect to evolutionary differences.
4. Respondents will gain a fundamental understanding of how to apply the Scientific Method of investigation to hypothesis generation, testing, analysis and communication, and develop basic laboratory and field skills.
5. How do PSLOs support college-wide SLOs (CWSLOs)?

This is mapped/discussed in Table 19.

1. How do course-level student learning outcomes (CSLOs) and other program learning experiences support the PSLOs?

See Table 20 in attached document “Table20CSLO Mapping to PSLO Biology”.

PSLO 1

* All courses offered in Biology stress critical thinking and making connections between concepts across the curriculum though evolutionary concepts and the tree of life are not as important to the curriculum in BIOL 110 and 112 as they are to the rest of the Biology courses where evolutionary concepts and the tree of life are fundamental underpinnings of the curriculum (Table 20).

PSLO 2

* This PSLO stresses knowledge of evolution and evolutionary patterns and it was included in the PSLO’s because evolution is so fundamental to biology as a whole and especially biology transfer students need to have a sound understanding of evolutionary concepts. However, evolutionary concepts are not nearly as critical to the curriculum of more health and medicine related courses such as BIOL 110 (Human Anatomy) and BIOL 112 (Human Physiology) as reflected in Table 20.

PSLO 3

* Almost all courses offered in Biology include a component that teaches the students to be able to carry out experiments, interpret their scientifically generated data and to be able to communicate scientifically in a lab report (BIOL 102, 105, 106, 112, 210) or other scientific writing (BIOL 100, 110) (Table 20).

1. What methods did you use to assess these PSLOs (methods may include student survey, portfolio, exit class, etc.)?

PLSO assessment was done in three ways. As the CSLO’s are more detailed versions of the PSLO’s, course level SLO assessment was one way to assess PSLO achievement. The other way that assessment was done was via in-depth interviews with 5 former biology students that are now attending upper-division biology courses or that have since graduated from a biology program at a 4-year university. Lastly, I also looked at the findings of CWSLO assessment from the most recent (2016) Year-End Campus survey.

1. What were the most meaningful findings from the assessment of PSLOs (which outcomes showcase student achievement; which indicate a need for program improvement?)?

**CSLO Assessment**

A recurring theme in course-level SLO assessment is that some of the best assessment tools for at least some of the SLOs are not in-class tests but alternative tools such as take-home tests, assignments etc. However, with these I find that sometimes too many students do not fully complete the tests or assignments or do not do them at all. In my professional judgement and from knowing students well by the end of the semester this is not due to the student not being capable of completing the tests/assignments but other issues such as the student feeling overwhelmed, burned-out, being unable to stay organized and stick with priorities etc. Over the years I tried to manipulate the too-low completion rates by changing due dates around to distribute the workload more evenly, but this also only had very limited success.

The SLO assessment and the frustration with the observation above has made me come to the following realization: indirectly embedded in all SLO assessments, is whether a student is able to sustain their effort throughout the semester. Researcher Angela Duckworth has called this ‘Grit’ which she defines it as perseverance and passion for long-term goals. I have seen some improvement especially in completion rates when I started explicitly to introduce the concept of ‘grit’ at the beginning of the semester and then frequently referred to it throughout the semester explicitly with examples (Researcher X worked 9 years on figuring out the concept we are learning in 25 minutes now that scientists understand it). I also not only let ‘boring’ or ‘tedious’ activities in lab gathering data be okay, but emphasized that not all scientific activity is as exciting as a David Attenborough documentary and again, that perseverance (gathering boring data) is needed for an amazing goal (passion for wanting to understand how things work).

I am starting to see that by talking to students about ‘grit’ explicitly rather than manipulating them like I tried to do by changing the due date for the assessment assignment, that more students are completing assignments and the learning from students attempting and completing those assignments will also help them attain the PSLOs.

**In-depth Interviews:**

I had in-depth personal interviews with students that transferred in the last 4 years. Two students have since graduated and are working in a biology-related field, 1 student has almost finished a Master’s degree and two students are still finishing a 4-year degree.

All students expressed that they felt well prepared when they started taking biology courses at their transfer institutions. All remarked on how rigorous upper-division biology courses were and said they were glad that the biology courses at FRC were also academically rigorous so they felt prepared and ready.

Students especially expressed that they were glad to have been taught to communicate scientifically and to write a lab report (PSLO 3). One student said that their professor chose their lab report as a stellar example for other students in his junior-level course!

Students had the most difficulty with getting used to a university many times larger than FRC and all students interviewed had at least one problem that at first seemed difficult to solve at a large institution. However, these problems were not related to biology in particular but more to the students having to figure out how to navigate anything at a much bigger institution and as FRC is a small institution is not necessarily something we an address and/or adequately prepare students for.

Students also expressed that DNA technology at FRC is much more simple than what it available at their universities and that some felt that they had a steeper learning curve than some of their class mates, but none felt that it was particularly difficult for them to master the new technology.

One student who is pursuing a Bachelor’ of Science in Nursing expressed the need for a cadaver – however, the program has had a cadaver since Fall 2015, so this is a program improvement that I hope will help especially students in the health sciences transfer more smoothly into upper-division human biology courses.

**Year-End Survey**

Out of 113 respondents, 11 students (9.7%) specifically mentioned Biology courses when asked: “from which courses did you benefit most?” This represents nearly 10% of all respondents and only Math and English courses were named more often than Biology (Table 15).

1. What are the program’s overall strengths and weaknesses? Describe any changes in the following since the last program review. Explain the reasons for those changes, and their impact on the program.
   1. Curriculum (including articulation and course scheduling)

The issue of strength and weaknesses has not substantially changed since the last CPR in 2011. I have been at FRC for 12 years at this point and I feel the Biology curriculum is overall in great shape. The in-depth interviews I conducted with former students bears this out and so do the other assessment tools for the PSLO’s (see discussion above). Another indicator that the curriculum in Biology is fully appropriate and complete is that the courses and the course contents of all FRC Biology courses already matched the courses and curriculum content for the Biology Transfer Degree. Though the Biology courses for the major students are in great shape, there are weaknesses in other areas that are part of the Biology degree such as calculus-based Physics and Organic Chemistry. Calculus-based Physics has been offered in some academic years especially when faculty members Kramer and Rico were on staff but has not been offered recently and before that was scheduled very awkwardly for an all-day Tuesday course, which for many students made it impossible to fit into their schedule. There have been other years when it hasn’t been offered at all, such as this current (2016-2017) or previous (2015-2016) academic year. Sometimes Physics is not offered because of low enrollment, sometimes because of lack of an instructor or more pressing needs for other courses. Organic Chemistry has not been offered in many years. According to Dr. Kokosinski, the number of students needing Organic Chemistry is usually very low and the students are often not prepared for the rigors of Organic Chemistry. Also, since the FRC Bachelor’s program coming online, the need for General Chemistry has increased substantially so I do not foresee that Dr. Kokosinski will have the time to teach Organic Chemistry in the future. However, the situation in both Physics and Organic Chemistry forces FRC Biology students to graduate without these core classes, which they for transfer then have to take elsewhere. This also explains the low rate of students taking the actual Biology degree (Table 14) – most biology students fulfill as many transfer requirements as they can and then leave to take the missing courses elsewhere. In the long run this does the students a long-term disservice, because it prolongs the time it takes them to graduate with a bachelor’s degree. One of my current ‘star’ students is a case in point: Because of the lack of courses necessary for the degree he will leave FRC at the end of the Fall semester and take the missing courses at San Jose State before transferring to a UC. He will not graduate from FRC and not graduate with an AS in Biology. Other students decide to not go for the entire Biology degree and instead opt for the Liberal Studies degree which will force them to make up core life science courses later should they still want to opt for a biology-related major. Two of these students that graduated with the Liberal Studies degrees last May spent the entire summer getting physics and O-chem done and were not able to work and save money before attending their transfer universities. The history of very low numbers of students actually taking the FRC AS in Biology suggests that students seem to be opting for choices other than the AS in Biology (Table 14).

The above discussion is the reason that I have not yet created a Transfer Degree for Biology which is a weakness in the program.

* 1. Instructional methodology (i.e., distance education)

BIOL 100, Concepts in Biology has been taught for the Incarcerated Student Program since 2011 every summer with the exception of Summer 2014. As the labs are taught on-site in the prisons, we made a great effort to align the labs as closely as possible with the on-campus labs. Since Summer 2012 the Research Story Assignment was added. We picked 6 topics we thought the students would be interested in and put together research materials copied from the library as well as the internet and other textbooks. The ISP students do not have the choice to research any topic in biology that interests them, but otherwise this assignment is identical to what is taught on campus. In addition, I am able to give the students direct and personal feedback by grading their draft assignments while I am visiting the prison for a week of labs, so the students get nearly the same amount and quality of attention as an on-campus student may get. However, the lecture portion of the ISP BIOL 100 remained poorly aligned with the on-campus course because it was taught by a different instructor that does not teach the on-campus BIOL 100 lectures. As the lead instructor for the on-campus BIOL 100, I re-wrote the lecture content for the ISP BIOL 100 course for the Summer 2015 course and have also used it for the Summer 2016 course. For both courses I asked students for feedback on the modules and in general students seemed to like the modules and to find them useful for studying and learning. As far as performance goes, I just completed SLO assessment for both the ISP BIOL 100 and on-campus BIOL 100 courses from the last two academic years, and it does not appear that the ISP students are more disadvantaged than the on-campus students or that they do worse than on-campus BIOL 100 students. The two groups of students differ somewhat: for example, ISP BIOL 100 students do not tend to miss any labs both because they are in the strictly regulated prison setting and because 10 labs are taught in two weeks rather than stretch out weekly throughout the semester. The lecture performance of ISP BIOL 100 students is comparable or better to most semesters of BIOL 100 on campus and in general the ISP BIOL 100 students did much better on the research story assignments though I think this might be due to the fact that the ISP student cohorts take BIOL 100 as one of their last courses – meaning that none are still at the basic skills level as is the case for many on-campus BIOL 100 students.

* 1. SLO Assessment

See discussion in B.7.

1. Describe any proposed future changes to the following. Explain how these changes will positively impact the program and improve achievement of PSLOs?
   1. Curriculum (including articulation and course scheduling)

I am not currently proposing any major changes to the curriculum. As mentioned above, the curriculum in FRC Biology courses is closely aligned with the curriculum for Biology courses for the Transfer Model Degree.

* 1. Instructional methodology (i.e., distance education)

The program has done well in fully aligning the ISP non-majors Biology course with the on-campus course and SLO assessment has shown that the ISP students have somewhat different difficulties but that they are overall not disadvantaged by the correspondence method of the course.

I am considering changing the on-campus BIOL 100 course to a hybrid model where the Friday lecture is online. Fridays are typically a day where many students are absent – most often because of athletic game schedules. The advantage would be that all students would easily be able to access the Friday lecture material. The disadvantage would be that generally a high % of BIOL 100 students fall into the basic skill level and often do not have the best study habits. With the Monday study groups for this course and with the buddy-system of sharing lecture notes from Friday lectures, many students do at least somewhat catch up on missed lectures but with an online component each students would have to be more self-responsible for keeping up. Another observation that makes me hesitate moving 1/3 of the course online is that I find that many of the basic-skill-level students also have major problems with using technology such as the library data bases, Turn It In, Knight Cite Citation Service or Canvas or even the Facebook group that I create every semester for this course. So far, every semester I have decided to keep the traditional Face to Face model for every lecture.

* 1. SLO Assessment

See discussion in B.7 and B.8.b.

**C. Physical Resources**

1. How is the program affected by the size, type and quality of available:

In the years before 2011, the enrollment in Biology courses increased quite a bit and in my CPR from that year I expressed much concern because it felt like the program was close to or over capacity. Since then enrollment has dropped somewhat and pretty much held steady between 350-400 students per Academic year (Table 16). This decrease post-2010 was FRC wide and as the % of students in Biology courses vs. FRC as a whole has held very stead this is probably not related to any specific problem or issue related to Biology (Table 16) but reflects a college-wide trend. This steady and somewhat reduced enrollment trend has alleviated some of the pressure on the facilities and faculty that was acutely felt when I wrote the 2011 CPR. However, if there is significant growth in the Bachelor’s Program I forsee even greater pressure on the resources of the Biology Program then in the pre-2011 academic years.

* 1. Physical space and facilities
* The program has one wet-lab (Science 107) that is used by all BIOL as well as some ENVR courses (ENVR 241 – Wildlife Diversity & Field Techniques, Sierra Nevada Natural History), Anthropology and Fisheries as well as Agriculture (AGAS 120 Intro to Animal Science, AGAS 125 Animal Feeds and Nutrition). In Fall semesters Sci 107 is basically used between 9 am to 10 pm Monday through Thursday as well as Fridays in the morning. Currently it would not be possible to offer any additional sections in Fall semesters except Wednesday night from 7-10 and Friday afternoons, and in Spring semesters Tuesday and Friday afternoons or Tuesdays-Thursdays from 7-10pm. In addition, BIOL100 labs due to their large size use Science 104 in addition to Science 107. Due to scheduling conflict and lab room needs, labs for ENVR, ANTHRO as well as BIOL are at times been held in Science 101 instead of Science 104. This means that the instructor has to move specimens and other lab materials such as microscopes before and after lab and has also meant space-driven adjustments in curriculum as Science 101 is not a full wet lab: for example, it does not have gas outlets or safety features such as an eyewash fountain and Science 104 is just a big regular classroom (it does not even have lab benches or sinks). Thus the current use of other classrooms for life-science related labs, though somewhat possible, is far from ideal. As has been noted every year in APRs for Biology for the past several years, analysis of classroom usage of the wet lab in Science 107 has demonstrated that the Biology program space-wise is close to capacity and that significant growth in the program would mean a second wet-lab space as well as additional faculty. The need to expand the lab facilities available to biological science courses, will most likely be due to rising enrollment in nursing/allied health, health and exercise science as well as the new Bachelor’s program.
* One need that is coming up is that the floor in Sci 107 needs to be re-done in the not too distant future (Figure 6, 7).
* Two issues that were problems in the last CPR have been addressed. Science 107 now has a safety shower and the heating system in the Science building was replaced.
  1. Information technology

All classrooms used by the program have smart podiums and technological issues are usually addressed quickly by the maintenance staff. A problem with blocked internet sites, though much better than in the past, persists especially for material related to sexuality and reproduction. Sometimes there is also inconsistency where office computers will allow access to a particular site, but the classroom computer will not. However, though this still happens, it is becoming less frequent.

My dream has been to get access to newer technology such as a smart podium where lectures can be written and drawn on-screen, projected and then saved as a file. It seems like that getting such technology bought and installed is really difficult.

* 1. Library holdings and services

The library holdings are adequate. The FRC library’s book collection for life-science related topics does have many books that are rather outdated, but this has improved in recent years especially with E-books. The library also makes every effort to obtain more current books for students who need them through inter-library loans. And for much biology research at the lower division level the library’s databases are more than adequate.

* 1. Instructional equipment and supplies

My budget for Instructional equipment and supplies has been adequate in the last few years as have my student worker hours!

1. Have there been significant changes in the program’s facilities, technical infrastructure, or other resources since the last review? If so, how have the changes impacted the program?

* The Biology program now has a cadaver. The cadaver was purchased from UC Davis. The cadaver is housed inside a storage casket, on a dissection gurney that can be rolled into the classroom and is stored in a separate, secure, temperature controlled storage located behind Sci 107. Though the purchase of the cadaver and dissection gurney as well as the refrigeration unit and the cost of putting up the storage building were significant, the impact on the program has been nothing but positive. Students get to regularly see what the anatomy they are learning about actually looks like in a real human body. The cadaver has also been great for demonstrating the health effects of being overweight as the organs show lots of fat deposits. Seeing the actual physical consequences of a less-than healthy diet has much more impact on especially younger students than lectures, documentaries or images.
* My student worker hours have significantly increased in the last two years. This has allowed me to keep the preparation lab in much safer shape as well as have two student workers, where one worker can train the other to some degree, freeing up my time for other tasks.
* The Biology prep lab now has a dish washer which has been nothing short of amazing in terms of the time saved as well as the much cleaner glassware and equipment!

1. What are the program’s projected needs in facilities, technology, or other resources, and how are these needs related to program goals? Are these goals supported by results from the assessment of program and course-level student learning outcomes?

* Projected needs for facilities: see discussion in C.1.a.
* Projected needs for additional faculty: see discussion in D.2.

Objectives and goals in staffing are based especially on the observation that the program is close to capacity both in terms of staffing and space. Significant growth in the Bachelor’s Program or for any other reason would bring the program above its capacity (see discussion in D.1. and C.1.a).

These objectives and goals are not directly tied to outcomes of the SLO assessment but obviously meeting and improving SLO’s would be greatly hindered without adequate staffing and space.

###### D. Staffing

1. What is the full- to part-time ratio of faculty within the program? (Determine the ratio by counting up the number of sections taught by full-time faculty and the number of sections taught by part-time faculty in the most recent semester for which the data is available).

See Table 17; I am not sure this is the correct calculation – it’s a bit confusing how to count the lab sections. Table 18 shows the equated load of full-time vs. part-time faculty.

1. How does the current staffing structure positively and/or negatively affect the program?

I would like to begin this answer by saying that I have excellent Associate Faculty in Jim Cross, Michelle Fulton and Michelle Petroelje and as long as I have these three the Biology Program should be able to staff all sections currently offered. However, as can be seen above, there is definitely quite a bit of room for another instructor in Biology especially in Human Biology.

I have brought up this issue in my APR since 2010. In a 2013 survey of faculty needs for FRC, Biology was ranked third but despite this it has never been seriously discussed for several reasons:

* Funding
* Other (more pressing) hiring needs

However, I am very concerned that with the additional biology needs of the new students in the 4-year degree that we might not be able to offer enough sections. For this first semester of the Bachelor’s Program, my BIOL 102 course has been much impacted with 36 students wanting to enroll when there are only 24 lab spaces. As it is, there are currently 29 students in the course, making labs very crowded.

The program, though it currently has excellent Associate Faculty, is extremely vulnerable to losing a faculty especially in the area of Human Biology as was shown in Spring 2013 when there was no other qualified faculty available than Michelle Petroelje after Dan Smith left. There is definitely more than enough load for another full-time faculty: Human Anatomy and Physiology accounts for a 6-year average of 30.47 FTSE (2010-2016 for the regular academic year plus summer) (Table 1). For the regular Academic Year, the Instructor load for Anatomy and Physiology is 22.8 equated units and the Instructor load for BIOL 100 alone is also 22.8 – and these calculations do not include Summer Anatomy and Physiology and BIOL 100 course nor ISP BIOL 100.

The average 6-year FTSE for ISP Biology is 6.4 (2012-2014) which is also currently a summer course, but which is staffed by overload and/or associate faculty (Table 1).

1. What are the objectives and goals in staffing to make this program more effective? Are these goals supported by results from the assessment of student learning outcomes described in Section B? (see also Appendix G-1: SLO Assessment Forms from Prior Years)?

* Projected needs for additional faculty: see discussion in D.2.

Objectives and goals in staffing are based especially on the observation that the program is close to capacity both in terms of staffing and space. Significant growth in the Bachelor’s Program or for any other reason would bring the program above its capacity (see discussion in D.2. and C.1.a).

These objectives and goals are not directly tied to outcomes of the SLO assessment but obviously meeting and improving SLO’s would be greatly hindered without adequate staffing and space.

In terms of being able to offer a TMC in Biology, additional courses in Physics and Organic Chemistry would need to be offered on a regular, ongoing basis in order to fulfill all course requirements for a TMC (see discussion in B.8.a) however those courses fall outside the Biology Program.

###### E. Student Retention and Success

1. Describe any significant trends within the student demographics of the program (see Appendix G-2: Data Sets for supporting information).

A much higher % of female students takes Biology courses vs. the % of female students at FRC. Though the % of female students is on average 4.6 % higher at FRC vs male students, the average % of female students taking Biology is 17.66% higher than male students taking Biology. This is probably due to the traditionally more female-oriented work force of the Allied Health related fields which still attract many more women than men (Table 4, Figures 3, 4).

Between 2011 and 2016 a lower percentage (average 7.8%) of Hispanic Students took Biology courses vs the average 18 % of Hispanic Students at FRC Table 5, 6). Between 2011 and 2016 a higher percentage (average 66.8%) of White Non-Hispanic Students took Biology courses vs the average 59.6 % of White Non-Hispanic Students at FRC (Table 5, 6)

1. What are the program’s strengths or weaknesses in the area of student retention and success (see Appendix G-2: Data Sets for supporting information)?

There is no data available for student retention.

If I define student success by the % of students that received a grade of C or better in Biology courses, the success of Biology students is very similar to FRC students as a whole and generally 1-2% higher (Table 10). When outcomes such as W, and FW are excluded, generally a lower % of students receives a failing grade (D+, D, F) when compared to the FRC student population as a whole (Table 11) but a higher % of Biology students ends up with a W or FW when compared to FRC students as a whole (Table 12). In my experience this higher rate of W and FW’s is for two reasons:

1. Basic-skill-level students end up in BIOL 100 because the basic skill courses do not count towards athletic eligibility. The program provides extensive support to all BIOL 100 students with two study groups per week, with one of the instructors (Billy Ogle) being available in the Instructional Resource Center on a daily basis and by a close relationship with all coaches which includes a 3-4x a semester update on all grades of their student athletes. However, sometimes the students that need the help the most are the ones that consistently do not seek help and these students end up withdrawing from the course (Table 13). Table 13 summarizes ethnic groups in Biology courses that appear to be at the highest risk of non-success (grade below C, W or FW) in Biology. Ethnic categories were included if more than 5 students fell into the non-success category. The highest rate of non-success was in non-Hispanic White students but that may not be surprising as the vast majority of FRC students are non-Hispanic White (Table 5). Non-success rates seem especially high for Non-Hispanic Black and Hispanic students and within Non-Hispanic Black students especially males experience higher levels of non-success. These two ethnic groups tend to be either in BIOL 100 (Concepts of Biology) and to a lesser degree in BIOL110 (Human Anatomy) and very rarely enroll in other Biology majors-level courses. This is probably partly due to the impression that Biology is still perceived as a more ‘female’ major especially with respect to the Allied Health fields and partly due because at FRC students belonging to these ethnic groups tend to be student athletes who often chose to stay with a more general major such as liberal studies. In addition, as currently all FRC Biology courses require a lab which schedule-wise conflicts with athletic practice times. All coaches know that the instructors in Biology are flexible in navigating the lab schedule and the athletic practice and game schedules, but typically only the higher-skilled and more motivated students can actually manage both well and many chose not to take majors-level Biology courses.

In my opinion, these are not only issues in Biology at FRC but issues that are seen at the whole FRC college level as well as at other colleges across the nation. I also feel that the Biology Program and the Biology Instructors at FRC are committed to make Biology courses successful for students with the resources available.

1. Students in Biology majors courses sometime overestimate their skill level and commitment and underestimate the work required to succeed in a majors-level Biology course and end up withdrawing (Table 12). There is also a small, but consistent group of students every year that is attracted to the Biology major because ‘the students love animals’ or ‘Discovery Channel and Nature documentaries are their favorite film viewing choices’ but the reality of the curriculum and the level of commitment and work it requires is not something the students had previously encountered or considered.
2. What objectives are needed to better ensure student retention and success? Are these goals supported by results from the assessment of student learning outcomes described in Section B? (see also Appendix G-1: SLO Assessment Forms from Prior Years)?

Overall I feel that the Biology department makes quite a big effort to offer intervention and help to student thus trying to ensure student success and retention with weekly study groups, with a close working relationship with Billy Ogle in the Instructional Resource Center and with a general willingness of the instructors in the department to be flexible around athletic schedules etc.

One ongoing objective that also supports the goal of improved student retention and success is a close relationship with the athletic coaches with frequent communications. In addition to filling out student progress reports, I also update coaches 3-4x a semester on the progress of student athletes in my courses as well as giving suggestions on what individual students need to do to succeed. Some coaches are great to work with this way; others do not specifically respond to the information in the updates or do not strongly encourage students to take the suggested measures. I find that student success of athletes very much hinges on how responsive the coach is willing to get with respect to the academic performance of their athletes.

For non-athletes I have used the Early Alert/Student Intervention tool but with extremely limited success. Though I appreciate having this tool available it’s efficacy appears to be limited perhaps as there is no direct consequence for the student to lose something they are passionate about such as losing privileges on the team or losing eligibility to play.

**F. Outreach and Compliance**

If program faculty and staff are tasked with outreach and/or compliance efforts, which can include outreach, working with advisory committees, consulting or technical assistance, service-based instruction, compliance with laws or regulations, or economic development, please respond to the following.

1. In what types of community outreach does the program engage, and how is the program’s academic and professional expertise extended to the local communities?

The program attends the annual Elementary School Science fair. Anna Thompson is a certified volunteer with Lake Tahoe Wildlife Care and advises about 2-3 community members a month as to what to do with injured wildlife and occasionally rehabilitates injured wildlife as time and resources permit. Anna Thompson has also been the 4H leader for the dairy goat project for American Valley 4H since 2012.

Anna Thompson connects students to experts in the community through field trips to the Quincy Water Treatment Plant, the Microbiology Lab at Plumas District Hospital and the staff at Barry Kirshner Wildlife Sanctuary.

Anna Thompson has also served as one of the faculty members that help place students for the Forest Service Internship Program.

Jim Cross and Michelle Petroelje take their students to the Anatomy and Cadaver Lab at University of Nevada, Reno.

Jim Cross invites Greg Perkins to talk about his Radiology department at Plumas District Hospital and he invites an employee also from Plumas District Hospital to come talk about blood banking at the hospital.

All these field trips serve a dual outreach function in both making students aware of opportunities in the community outside FRC and to make the community aware of the programs FRC offers. Personal connections between FRC faculty and community members have helped many a FRC student land a job that is related to Biology.

Michelle Petroelje, in her other role as ETS advisor, often talks about the benefits of taking classes at FRC while still in high school.  She especially encourages participation in Summer Biology for current 11th and 12th graders.  She talks to just about all Plumas county 11th graders in the spring during Junior Jumpstart at each school.  She also meets with many 12th graders in the spring as well when the ETS Program administers the Accuplacer test.    She also coordinates with Michelle F. and with Upward Bound so that their graduating seniors have the opportunity to take Summer Biology 100 as part of the UB Summer Bridge program.  Michelle Petroelje has also talked with Matt McMorrow, the QHS Biology and Anatomy teacher.  He knows that we have a cadaver that could be viewed by his class.

1. If there is a program advisory committee, list the names and titles of members, and the meeting dates since the last program review. Describe any advisory committee involvement in this program review.

Not applicable.

1. How does the program help the College comply with laws, regulations, and other legal or certification requirements?

The Biology program strives to operate safely within Cal-Osha guidelines and rules. Students typically receive a safety lecture and complete a safety activity at the beginning of each semester during the first lab and students are frequently reminded of safety as it applies to the type of lab activity. The department is also careful in making sure that there is Liability Waiver on file for each student in a lab course as well as the Travel Waiver for Biology courses that include fieldtrips. The storage and preparation lab room next to Science 107 has special storage for flammable substances as well as acids and bases. The department also strives to keep the storage and preparation room safe; however, with up to 8 different labs every week, the department at times struggles to keep up. In recent years, student worker hours have been increased and this has made a big difference in the department’s ability to keep up with house-keeping and consequently keeping the lab and the storage and preparation lab a safer space.

The program has recently updated all Title V’s on Curricunet.

The program strives to meet all accomodations that students are entitled to under ADA.

**G. Appendices**

1. SLO Assessment Forms should be attached for the previous years, depending on the program’s review cycle.
2. DATA SETS
3. Program FTES

Table 1: Life Science FTES

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | All FTES | Summer FTES | Fall/Spring FTES | Anatomy/Physiology FTSE | ISP FTSE |
| 2010 | 92.96 | 17.49 | 75.47 | 33.7 |  |
| 2011 | 89.68 | 15.82 | 73.86 | 35.42 |  |
| 2012 | 84.47 | 17.8 | 66.67 | 26.6 | 5.8 |
| 2013 | 91.64 | 23.67 | 67.97 | 34.08 | 6.6 |
| 2014 | 79.42 | 18.19 | 61.23 | 24.78 | 6.8 |
| 2015 | 80.2 | 12.87 | 67.33 | 30.4 | 6 |
| 2016 | 82.8 | 21.44 | 61.36 | 28.36 | 9.2 |
| average | 85.88 | 18.18 | 67.69 | 30.47 | 6.88 |

Figure 1: Life Science FTES

Table 2: % FTES generated by the Biology Program

|  |  |
| --- | --- |
|  |  |
| 2010 | 4.72 |
| 2011 | 4.95 |
| 2012 | 4.61 |
| 2013 | 4.83 |
| 2014 | 4.48 |
| 2015 | 4 |
| 2016 | 4. |
| Average | 4.55 |
|  |  |

Figure 2: % FTES generated by the Biology Program

1. Duplicated Headcount

Table 3: Duplicated Headcount

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
| Biology | 494 | 429 | 467 | 393 | 442 | 425 |
| FRC | 13766 | 13398 | 13590 | 12909 | 13685 | 12504 |
| % Biology Students at FRC | 4 | 3 | 3 | 3 | 3 | 3 |

1. Demographic Information (duplicated headcount): Gender, Age, Ethnicity

Table 4: Comparison of % students by gender and between FRC vs. Biology

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
| FRC | Female | 52 | 50 | 50 | 52 | 54 | 56 |
| Biology | Female | 57 | 56 | 64 | 54 | 62 | 61 |
| FRC | Male | 48 | 50 | 50 | 48 | 46 | 44 |
| Biology | Male | 43 | 44 | 36 | 46 | 38 | 39 |

Figure 3: % Female Students in Biology vs. FRC

Figure 4: % Male Students in Biology vs. FRC

Table 5: Comparison of Ethnicity between FRC and Biology

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 2011 | | 2012 | | 2013 | | 2014 | | 2015 | | 2016 | |
| FRC | Biology | FRC | Biology | FRC | Biology | FRC | Biology | FRC | Biology | FRC | Biology |
| ? | 4 | 4 | 3 | 5 | 3 | 3 | 1 | 1 | 1 | 1 | 1 | 2 |
| American Indian or Alaskan Native | 4 | 4 | 4 | 3 | 4 | 3 | 3 | 5 | 3 | 2 | 3 | 4 |
| Asian or Pacific Islander | 3 | 3 | 4 | 4 | 4 | 4 | 3 | 3 | 4 | 7 | 5 | 4 |
| Black Non-Hispanic | 3 | 9 | 8 | 7 | 9 | 8 | 10 | 9 | 12 | 14 | 12 | 12 |
| Hispanic | 16 | 10 | 17 | 10 | 15 | 9 | 21 | 9 | 20 | 10 | 19 | 12 |
| Other | 5 | 5 | 5 | 5 | 4 | 3 | 3 | 3 | 3 | 3 | 3 | 2 |
| White Non-Hispanic | 65 | 66 | 60 | 66 | 62 | 71 | 59 | 71 | 56 | 63 | 56 | 64 |

Table 6: Comparison of Ethnicity between FRC and Biology

|  |  |  |
| --- | --- | --- |
|  | FRC Average % | Biology Average % |
| American Indian or Alaskan Native | 4 | 4 |
| Asian or Pacific Islander | 4 | 4 |
| Black Non-Hispanic | 9 | 10 |
| Hispanic | 18 | 10 |
| Other | 4 | 4 |
| White Non-Hispanic | 60 | 67 |

1. Number of Students with Declared Majors in Program

Data not available.

Figure 6: Floor damage in Sci 107



Figure 7: Floor damage in Sci 107



1. Number of Courses Offered

Table 7: Course offerings in Biology

|  |  |
| --- | --- |
| 1. BIOL 100 Concepts in Biology | every semester including summer on campus; 2 sections per year for ISP |
| 1. BIOL 102 Cell and Molecular Biology | every fall semester |
| 1. BIOL 104 Animal Biology, Evolution and Ecology | every spring semester |
| 1. BIOL 106 Plant Biology, Evolution and Ecology | every spring semester |
| 1. BIOL 110 Human Anatomy | Ever semester including summer |
| 1. BIOL 112 Human Physiology | every spring semester; every summer |
| 1. ENVR/BIOL 120 Sierra Nevada Natural History (reviewed in ENVR) | every fall semester |
| 1. BIOL 164 Animal Behavior | not currently offered |
| 1. BIOL 210 General Microbiology | every fall semester |
| 1. BIOL Directed Study/Independent Study | Offered as needed/feasible; last offered in 2010 |

1. Number of Sections Offered

Table 8: Number of Sections Offered per Academic Year

|  |  |
| --- | --- |
|  | Sections Offered |
| 2010 | 22 |
| 2011 | 16 |
| 2012 | 19 |
| 2013 | 21 |
| 2014 | 24 |
| 2015 | 24 |
| 2016 | 24 |

Figure 5: # Course Sections Offered in Biology

1. Average enrollment per section

Table 8: Average Enrollment and FTES per Section in Biology

|  |  |  |  |
| --- | --- | --- | --- |
|  | # Sections per year | Average Enrollment per Section (2011-2016) | Average FTES per Year  (2010-2016) |
| BIOL 100 | 7 | 26.7 | 37.34 |
| BIOL 102 | 1 | 20.5 | 3.8 |
| BIOL 104 | 1 | 24.7 | 4.3 |
| BIOL 106 | 1 | 22 | 4 |
| BIOL 110 | 3 | 31.9 | 18.74 |
| BIOL 112 | 2 | 30.2 | 11.73 |
| BIOL 210 | 1 | 19.3 | 3.8 |
| Average all courses |  | 25 |  |

Note: BIOL 164 was excluded as it has not been taught; BIOL 120 is cross-listed with ENVR 120 and is reviewed in the ENVR CPR and was excluded here also;

1. Course Completion Rate (# of students who received a grade/total students enrolled at census)

Table 9: % Students who received a grade in Biology vs. FRC

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
| Biology | 88 | 90 | 89 | 85 | 91 | 87 |
| FRC | 90 | 93 | 93 | 93 | 93 | 92 |

1. Student Success Rate (# of students with C or better/total students enrolled at census)

Table 10: Student Success (in %) vs. Student Failure (in %) in Biology vs. FRC

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | Average |
| Biology | Below C | 23 | 15 | 18 | 22 | 15 | 17 | 18.33 |
| FRC | 23 | 18 | 19 | 19 | 18 | 19 | 19.33 |
| Biology | Above C | 77 | 85 | 82 | 79 | 85 | 83 | 81.83 |
| FRC | 77 | 82 | 81 | 81 | 82 | 81 | 80.67 |
|  |  |  |  |  |  |  |  |  |

Note: Below C includes W, FW

Table 11: % Students who received a GRADE below C (D+, D, F) in Biology vs. FRC

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
| Biology | 11 | 8 | 7 | 6 | 6 | 4 |
| FRC | 13 | 11 | 12 | 11 | 11 | 11 |

Table 12: % Students not completing the course in Biology vs. FRC (W, FW, NP)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
| Biology | 12 | 10 | 11 | 15 | 9 | 13 |
| FRC | 10 | 7 | 7 | 7 | 7 | 8 |

Table 13: Ethnic Groups in Biology with the highest number of students achieving a grade below C (includes FW and W); Ethnic Group was included if 5 or more students fell into this category

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
| White M, F  Hispanic F  Black M | White M, F  Black F, M  Hispanic M | White M, F  Hispanic F  Black M | White M, F  Black M, F  Hispanic M | White M, F  Black M, F | White M, F  Black M |

Students Achieving BIOL degree.

|  |  |
| --- | --- |
| Year | # Students receiving AS in Biology |
| 2005 | 1 |
| 2006 | 5 |
| 2007 | 4 |
| 2008 | 1 |
| 2009 | 2 |
| 2010 | 2 |
| 2011 | 2 |
| 2012 | 3 |
| 2013 | 2 |
| 2014 | 2 |
| 2015 | 4 |
| 2016 | 5 |

Table 15: Data from the 2016 Year-End Survey

These findings may be compared to the answers to “Of which courses did you benefit most?”, where 113 students contributed an opinion, and the results may be summarized as:



Table 16: Total Enrollment of students in Biology Courses

|  |  |  |  |
| --- | --- | --- | --- |
| Year | Total number of students enrolled in Life Sciences | Total number of students enrolled at FRC | % students in Biology vs. FRC |
| 2009 | 459 | Don’t have data |  |
| 2010 | 476 | 3808 | 12.5 |
| 2011 | 401 | 3268 | 12 |
| 2012 | 377 | 3361 | 11 |
| 2013 | 411 | 3535 | 11 |
| 2014 | 361 | 3626 | 10 |
| 2015 | 355 | 3714 | 10 |
| 2016 | 372 | 3582 | 10 |

Table 17: Full-Time vs. Part Time Ratio

|  |  |
| --- | --- |
| Fall Semesters | ¾ FT/PT |
| Spring Semesters | ¾ FT/PT |
| Summer Semesters | 3/7 FT/PT |

Table 18: Equated Load for Full-Time vs. Part Time

|  |  |  |
| --- | --- | --- |
|  | Full-Time Faculty equated units - Thompson | Part-Time Faculty Equated units – Cross, Fulton, Petroelje |
| Fall Semesters | 17.4 | 16.8 |
| Spring Semesters | 17.4 | 16.8 |
| Summer Semesters | 5.7 | 17.1 |
| Total | 40.5 | 50.7 |

Table 19: Mapping of Program Level SLO’s to College-Wide Level SLO’s.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | CWSLO 1 | CWSLO 2 | CWSLO 3 | CWSLO 4 | CWSLO 5 | CWSLO 6 | CWSLO 7 |
| PSLO 1, 2  Respondents will be able to apply the biological concepts of structure and function, organization, cellular processes, genetics as well as ecology and evolution at all levels (molecular, cellular and organismal) and across the lineages of the tree of life.  Respondents will be able to compare and contrast features of living systems with respect to their common evolutionary origin as well as with respect to evolutionary differences. | All tests for majors-level courses are short-essay answer only. Tests for non-majors level course are 50% short essay answer.  Students work collaboratively in small groups in lab.  Students write a research story based on extensive research (non majors) or write essays and/or lab reports on scientific topics and/or experiments. | Students will be able to explain basic biological principles as well as use these principles to apply to, critically evaluate, investigate and communicate (written and orally) problems, questions and issues related to the specific curriculum of the course.  Students apply using the biological concepts learned to explore the biological basis for diversity in humans such as gender orientation, behavior, mental illness, race etc.  Students use concepts of math and other disciplines to simulate, model or otherwise explore and understand concepts in biology. | Students research a topic in biology using a variety of research tools and write a research story in which the information is used and evaluated (non-majors course).  Students research a topic related to a lab experiment or read a scientific paper as background for a lab experiment (majors-level).  Use of FB group, Moodle and Canvas for class organization and class communication.  Use of spreadsheets and graphing program to organize and present data. | Students apply using the biological concepts learned to explore the biological basis for diversity in humans such as gender orientation, behavior, mental illness, race etc. | Students will only be able to succeed in biology courses if they can set goals, be organized, use time management skills and are able to access resources and that can advocate for themselves if they encounter adversity.  Students will be able to figure out if they truly love biology and are willing to achieve goals in their biology education by working hard. |  | Students research a topic in biology using a variety of research tools and write a **research story** in which the information is used and evaluated (non-majors).  Students will only be able to succeed in biology courses if they can set goals, be organized, use time management skills and are able to access resources and that can advocate for themselves if they encounter adversity; that is they will only succeed if they can learn to be proactive. |
| PSLO 3  Respondents will gain a fundamental understanding of how to apply the Scientific Method of investigation to hypothesis generation, testing, analysis and communication, and develop basic laboratory and field skills. | Students write a research story based on extensive research (non majors) or write essays and/or lab reports on scientific topics and/or experiments. | Students work collaboratively in small groups trying to solve a scenario in biology using the scientific method. Students make predictions about the outcome of a lab experiment and compare their prediction to the outcome. | Students carry out experiments in lab which they then analyze, interpret and write up in lab reports (major courses) or short essay-type answers (non-majors course).  Students learn a variety of biological laboratory technology as appropriate to the course and course content. | Students learn to take their data at face value and honestly and not to manipulate data to fit a hypothesis or prediction. | Students learn to access the resources of previous labs in order to solve a laboratory ‘problem’ in a current lab. | Students work in small teams of 2-5 students in every lab.  Students communicate via social media on the class FB groups. |  |

Data can be found here:

<http://frc-sps-01/Admin/IR/TabularDataTest/Forms/AllItems.aspx>

This template is an adaptation of the Instructional Program Review template designed by Saddleback College.