Program Review – Annual Discipline Update for 2021-2022
PART A

SECTION 1: BASIC PROGRAM/DISCIPLINE INFORMATION

SAC Name: **Biology**

Disciplines included in this SAC: Biology

SAC Chair(s): Ben Simon

Faculty Department Chair(s): Aaron Payette, Elizabeth Rodrigues, Jennifer Hill, Sandy Neps

Program Dean/ SAC Administrative Liaison: Ken Friedrich

Pathway Dean: Alyson Lighthart

Please highlight where your classes are offered.

Classes/Services offered at: CA / RC / SE / SY / NB / HC / WCC / Metro / CLIMB
Other:

SECTION 2: REFLECTING ON DATA

All data cited below can be found here:
https://www.pcc.edu/institutional-effectiveness/program-profiles/
***Note the row of Tabs just below your Bookmarks Bar. Begin on the Home Tab. This is where you will choose your selection criteria for your data. Return to the Home Tab whenever you want to change your selection criteria. See the Help and Data Dictionary Tabs as well as the Data Directions Document included in the email with this template for more information.

Please include data from at least the last three years and up to the last five years. A 3-year enrollment review is recommended. SACs may have unique circumstances and reasons for looking more or less broadly.

2A.Enrollment (SFTE) per year; Location (where course is taught); Modality

2020-2021	Total SFTE	Onsite SFTE	Remote SFTE	Online SFTE	Hybrid SFTE	Blended SFTE
Cascade	440.4		421	6		13.3
Rock Creek	503.3		486.6	7.8		9
Southeast	153.4		153.4			
Sylvania	433		433			
Total	1530.1	0	1494	13.8	0	22.3

2019-2020	Total SFTE	Onsite SFTE	Remote SFTE	Online SFTE	Hybrid SFTE	Blended SFTE
Cascade	369.5	255	86.4	4.1	17.8	6.4
Rock Creek	433.1	293.9	112.9	7.9	13	5.4
Southeast	184.4	140	38.2		3.5	2.7
Sylvania	340.5	232	92.8		10.3	5.4
Total	1327.5	920.9	330.3	12	44.6	19.9

2018-2019	Total SFTE	Onsite SFTE	Remote SFTE	Online SFTE	Hybrid SFTE	Blended SFTE
Cascade	413.5	388.3		3.9	21.2	
Rock Creek	463.6	438.4		5.4	19.8	
Southeast	200.9	191.7		1.7	7.6	
Sylvania	354	338.9			15.2	
Total	1432	1357.3	0	11	63.8	0

2A1. Does this data suggest any questions that the SAC would like to pursue?

At this level of aggregated data, and with the transition to fully remote teaching during 2019-2020, year-to-year differences seem relatively uninformative. Designation by campus during remote teaching also doesn't tell us much since people didn't have to travel to campus and may have enrolled in courses without regard to which campus was officially hosting the course.

It does appear that enrollment overall dropped in 2019-2020, possibly due to uncertainty about how long the "shutdown" would be. Likewise total enrollment seems to have rebounded in 2020-2021, perhaps due to more people deciding to try online/remote learning, or changes in employment status or career goals. We wonder whether the same trends were seen college wide, and what the predicted enrollment changes are for the next few years.

We also wonder whether demand will drop or rise as we return to in-person instruction. Some faculty have noticed fewer sections running successfully during the start of the '21-'22 academic year due to lower than usual enrollment. This is at a time when most institutions have returned to in-person instruction with vaccine mandates, while PCC remains remote.

Some additional questions include: Do students choose the modality that really works for their learning, or is convenience a bigger influence. Will this lead to higher or lower success rates in the long term? Are we serving populations of students who may not have had access previously? How has the experience of learning remotely changed student expectations of what classes will look like moving forward?

2A2. Do the data suggest adjustments be made in your discipline, such as schedule or course offerings, with regards to enrollment? If yes, what ideas/strategies do you have that you would like to implement or have help with in the upcoming academic year?

Again, at this time, year-to-year differences seem relatively uninformative. We imagine that students will want course offerings in a variety of modalities. As we move forward with a Thoughtful Return and beyond, the SAC will need to make decisions about hybrid and online offerings during times that are not based on needs for emergency remote instruction.

Having the needed thoughtful and deep conversations around these topics will take time, which is already very limited due to other SAC responsibilities, and financial support for full participation of SAC members. If the SAC approves additional online and hybrid offerings, we will need support in developing shared shells to support equitable student success.

If the SAC approves additional hybrid and online offerings and work is supported to fully develop these options, the FDCs are prepared to schedule a variety of modalities to meet the diverse instructional needs of our students. It should be noted that many faculty are cautious about making any decision to start offering online laboratory courses, because many students in our discipline take prerequisite allied health courses that professional health programs require as in-person courses. We don't want to close the door to the students who we have been historically serving, in an attempt to increase student access. If the SAC does not approve online laboratory courses, then we need the college to support these faculty decisions based on curriculum needs and equitable student success.

Skill and awareness of what is possible in a remote setting has evolved quickly both at our local level as well as on the national landscape. We are positioned to have a productive conversation about what it means to lean into the new element in the PCC strategic plan of delivery: redefining the time, place, and systems of educational delivery to create a more learner-centric ecosystem. We now know what we can do, and we are ready to have the conversation about what we should do, to support a high quality, equitable education for students in the biological lab sciences.

While the SAC participates in meaningful conversations about future directions, it would be extremely helpful to have support continued in the following ways. Currently, our remote Anatomy & Physiology courses use online software in lieu of the hands-on laboratories that can be experienced in person. The college paid for access to this software during remote instruction, so the extra cost would not be incurred by students. We would appreciate extending the funding for such software through at least the '22-'23 academic year. The benefit to students extends beyond the period of remote instruction, since an online resource like this could help fill the instructional gap created when faculty moved away from the expensive publisher's laboratory manual. Additionally, the Cell Biology and Microbiology courses could use assistance supporting the purchase of student laboratory kits. A lower cost and flexible alternative might be to make the kits at PCC in conjunction with a shopping list for students. Faculty have collaborated and shown innovation by creating at-home lab experiences utilizing these commercial laboratory kits. However the expense has been shifted from the PCC lab support budget to the individual students (which is clearly inequitable.) College support to purchase these kits for students would allow more equitable access to hands-on science learning experiences during remote instruction and this period of transition.

Many faculty have expressed grave concern that they won't be able to work safely once remote instruction ends, and that we are having to make modality decisions based on fear rather than curriculum and student success. The most profound support needed immediately is the ability to instruct in-person safely. Reduced class capacities, mask requirements, and continued remote instruction are all appreciated, but most of these

protections will end by fall 2022. Surrounding institutions have enacted vaccine mandates. It makes sense, especially to many of our science-minded students and faculty, to enact a similar mandate as a way to keep our institution open. Extending the period we offer remote courses could partially alleviate concerns, because it is only a temporary designation that does not require laboratory courses to be moved online indefinitely. We absolutely need PCC to support safe in-person instruction, as a way to support our discipline and diverse student learning needs.

Realistic One-Year Goal

Engage the SAC in conversation about a safe return for students, faculty and staff, as well as how to take the best of what we have learned about teaching virtually, into the future.

Action: Extra SAC meeting to discuss issues
Measure: Does the meeting happen? Are SAC decisions made about a safe and thoughtful return for 2021-22?

2A3. Are there other data reports that you would find informative/useful with regards to enrollment? How would this information support decision-making for the SAC/discipline?

It would be helpful to know which students we served during remote instruction and if this differs from other years. Faculty commented that they felt like a different set of students were taking their remote courses. Some faculty noticed more high school students, while others noticed more post-baccalaureate students. Access to this information would help us make more meaningful comparisons using data obtained during periods of remote instruction. Information regarding student socioeconomic demographics would also help us determine which students benefit from the access provided by remote instruction and which students experienced barriers. For example, one of the arguments for providing virtual lab experiences is that it is an access point for students who may be homebound due to physical or other limitations. We saw an increase in enrollment in biology in 2020-21 compared to the previous four years, but we don't know if that trend will sustain. It would be interesting to know if this increase reflected the ability of students to access educational opportunities who might have been excluded previously. At the same time, we recognize that courses with only virtual lab experiences create technological access barriers for students who may not have the financial means to purchase lab materials or to support necessary devices and software.

Since many of our courses are prerequisites for health care related fields, it would be helpful to have access to labor market data. Partnering with advisors to access data related to student career goals would allow courses to be offered strategically. Similarly,

data gathered through the advising process would also help develop projections for sequence courses. This data could further inform existing interdisciplinary coordination with departments such as Chemistry, to facilitate course offerings that allowed students to more efficiently complete a prescribed course of study, such as the major's transfer map (MTM) for biology.

2A4. Is your program aware of any external influences that strongly affect recent enrollment? For example, state requirements, transferability challenges, other university policies, etc. Please explain.

The COVID-19 shutdown, remote instruction, and economic disruption have all influenced enrollment in myriad ways; some of which we may never fully appreciate. As we transition back to in-person teaching, there will probably be unpredictable changes in student demand for Biology courses.

It makes sense that the labor shortage in healthcare will continue to drive high enrollment in prerequisite courses for allied health careers. We'll need to make careful consideration of the relevancy of our course offerings, as we consider possible new course modalities. Some of our students take allied health prerequisite courses at PCC because they are in-person, and the professional health programs to which they're applying only accept in-person course prerequisites. We might lose the ability to serve these students if we move to online instruction. Without a way for an academic transcript to distinguish between online and in-person courses, this could significantly deter future enrollment.

The influence on Non-majors and Majors biology courses will likely be driven by the overall demand for higher education; which is difficult to predict, especially given the uncertainty around the pandemic and economic recovery post-COVID.

The recent statewide articulation agreement for the Major Transfer Map (MTM) in Biology may influence patterns of course taking by students seeking to transfer to a four-year institution to major in biology. The stipulation in the current biology MTM that the Principles of Biology series be all taken at the same institution, may influence the amount of horizontal movement of students between institutions. It will be important for us to mindfully schedule this sequence class to allow students to complete the series given these constraints.

The recent Senate Bill 233 (2021) calls for development of a common course numbering system to address credit-transfer related concerns. Courses that may eventually be impacted by this legislation include BI 101, 200 level A&P, and the Principles of Biology series. However, it is unlikely that changes to any of these courses would be in place before Fall of 2023 (and more likely that it would be later), and therefore SB 233 would not impact enrollment patterns in the coming year.

2B. Course Success Rates

Data Definition: Success rate represents the percentage of students who successfully complete a course. It is calculated as:

$$\%\ S = \frac{\text{Number of students receiving a grade of A, B, C, P, PR, or CM}}{\text{Number of students receiving a grade of A, B, C, D, F, P, NP, I, W, PR, CM, N, UP}}$$

PR, CM, N, and UP are non-credit grades used in the Adult Basic Education program.

Success rates for gender and race are not calculated when the enrollment is less than 5. For any success rate that is not calculated, the total for that column is also not calculated.

% Success By Course and Modality **SEE Modality Tab**

2B1a. Are there any **courses** with lower or higher pass rates than others (over time, over many sections, or a notably higher or lower rate)? If so, which ones?

The overall pass rate for biology students in 2020-21 was 80% (n = 10941). Courses with pass rates below 80% included BI 141, 112, 101, 202, 231 and 145 (see Figure 1). The low pass rate for Forest Habitats, BI 141 (66%, n = 133) was a drop from previous years (80%, n = 71, 2019-20; 88%, n = 24, 2018-19) . BI 141 is a relatively low enrolled course and this may reflect a number of individual student factors related to the pandemic. This may also be true of BI 202 (76%, n = 21), and BI 145 (79%, n = 24) which were also very low enrolled courses. The relatively low success rate in BI 101 for 2020-21 (74%, n = 802) was consistent with success rates from previous years (73%, n = 1315, 2019-20; 70%, n = 1315, 2018-19). The first course in the Anatomy and Physiology sequence (BI 231) had a success rate below 80% (79%, n = 1783) but this was actually much higher than the previous two years (69%, n =1229, 2019-20; 65%, n = 1227, 2018-19). Cell Biology for the Health Occupations (BI 112) continues to show lower than average success rates, with very little change in 2020-21 (69.9%, n = 1863) compared to 2019-20 (70%, n = 1802) and an increase in student success compared to 2018-19 (65%, n = 1975).

Courses with pass rates higher than 80% (see Figure 1) that showed a notable (more than ± 5%) change in success compared to the previous year included BI 120, 121, 143, 213, 241, and 287. All of these courses except for 121 enroll less than 200 students per year. BI 121 saw a 9% increase in student pass rates in 2020-21 (82%, n = 517) compared to 2019-20 (73%, n = 540). This increase was consistent with the upward trend observed for this class (71%, n = 633) compared to 2018-19.

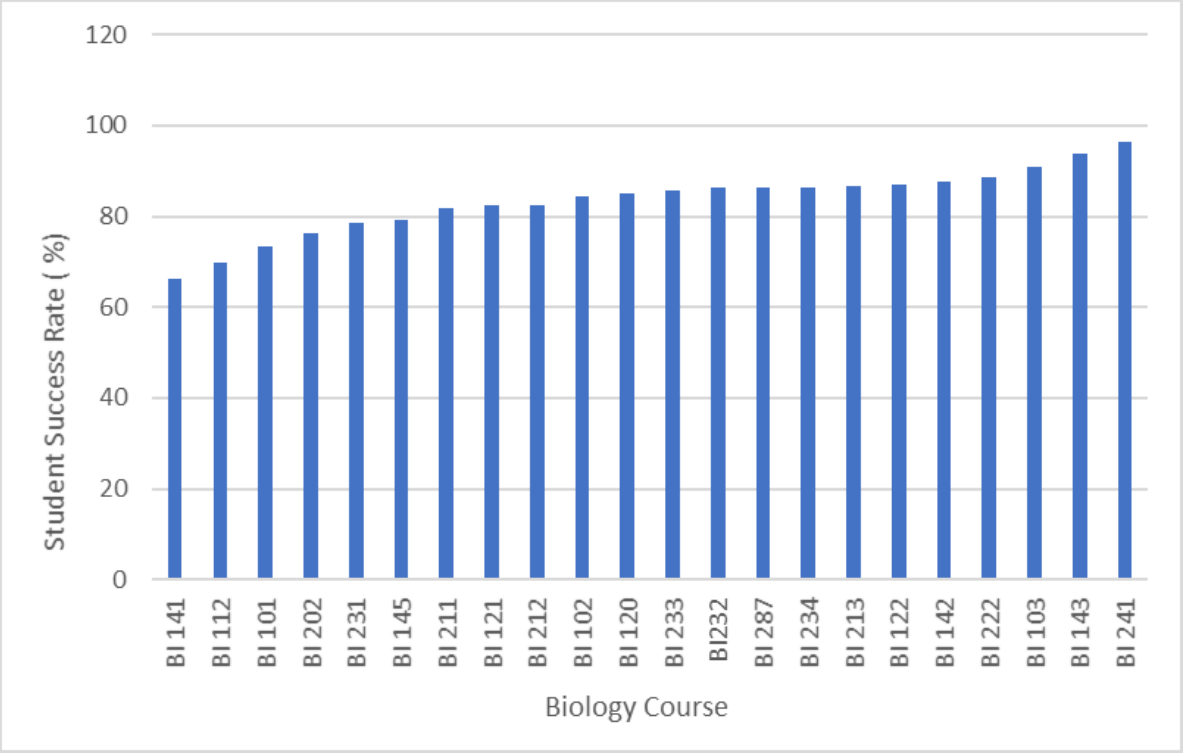

Figure 1. Comparison of student success rates in biology courses with enrollments over 19 in academic year 2020-21

2B1b. Are there any **modalities** with lower or higher pass rates than others (over time, over many sections, or a notably higher or lower rate)? If so, which ones?

This information is difficult to interpret given the confounding variables of the transition to remote learning and the stressors of doing so while in a global pandemic, increased impacts due to climate change, social justice uprising, political tensions and uneven economic impacts. The overall pass rate for 2020-21, 80%, which was higher than 2019-20 (see Figure 2). It is interesting to note while the overall pass rates for 2019-20 were 77.1% (calculated from onsite fall and winter quarters and remote spring quarter), the pass rate for classes offered remotely (spring 2020) was 82%. This suggests that there was some adjustment as both instructors and students acclimated to the remote learning environment. We also recognize the lack of assessment proctoring support received during this period of remote learning.

Biology has never fielded a large number of online classes, and the online courses we currently offer are lecture-only courses without a laboratory component. The online success rate for 2020-21 was 92%, which is much higher than previous years (i.e. 84.9% in 2019-21; 81% in 2018-19; 73% in 2017-18). The comparisons represent less than 200 students in any given year, with a large increase in numbers during the

pandemic (~57% increase in online class enrollment in 2020-21 compared to 2017-18). It is possible that the expectations, the demographics and the digital literacy of both students and instructors has changed in that time period.

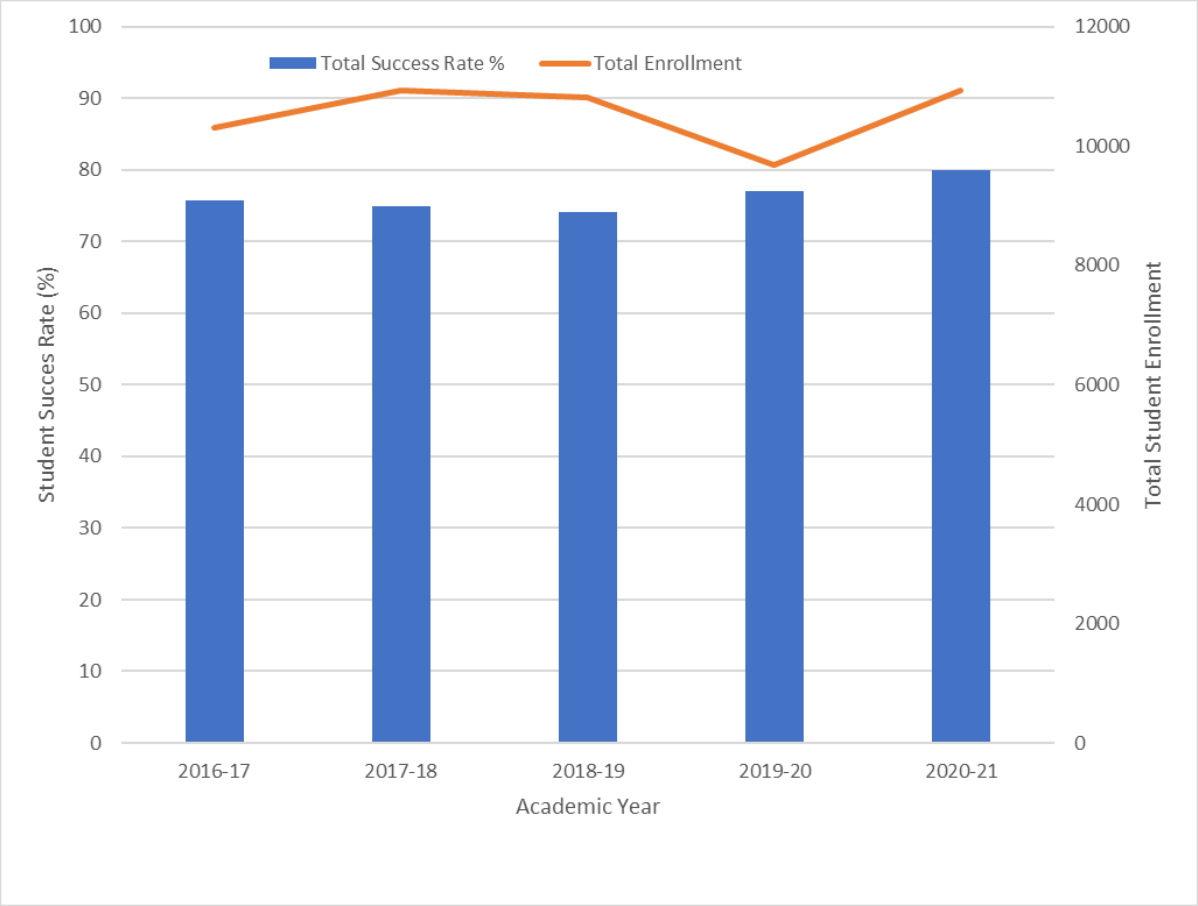

Figure 2. Comparison of total success rates and enrollment for students in biology for the academic years 2016-17 through 2020-21

2B2. Strategy Insights

What strategies have you used to maintain high success rates? What can be learned that might be applied to courses with lower success rates? What are possible actions to be taken to understand/address lower success rates? Please clearly explain how your discipline intends to explore content/curriculum, pedagogy/teaching, course material selection, etc. using culturally responsive teaching approaches throughout the next year. Try to identify a realistic one year goal.

Current Strategies to Support Student Success

Biology faculty report using many strategies to maintain and improve success rates in classes this academic year. Based on responses to a faculty survey consistent themes emerged for the strategies employed by instructors teaching all types of biology classes, to support the success of their students. Good teaching is an integrative process so some of the strategies for creating a good learning experience could fall under multiple themes but in the interest of space each is listed only once in Appendix A.

Course-structures

Course structures are a reflection of departmental norms and of the teaching philosophies of individual faculty. There is a growing understanding in the biology department that developing structures that are proactively designed to support student success is more powerful than reacting to student failure.

Examples of some of the many course-structure strategies that biology faculty are using to support student success (see Appendix A)

Relationship Building

Learning is a socio-cognitive process. Biology faculty responded with a keen awareness that the interactions between instructors and students and the interactions of students with each other are key elements to building the relationships that support the formation of an effective learning community.

Examples of some of the many relationship-building strategies biology faculty are using to support student success (see Appendix B)

Assessments

Biology faculty surveyed report an understanding that the structure of assessments in the classroom is very important to student success. Many report making adjustments in structures to support student mastery of course concepts. The commitment of many instructors to supporting students as whole people during the pandemic is exemplified by the comment of one BI 102, BI 112 instructor, “Especially during COVID, I have worked to be very flexible with students while also helping them keep up in class. I have had several students thank me for allowing extended deadlines and generally working with them when life gets in the way of classes.”

Examples of some of the strategies strategies that individual biology faculty are using to support student success (see Appendix C)

Anti-racist, Decolonizing, and Culturally-responsive Teaching

Teaching that reflects a commitment to being anti-racist, decolonized and culturally-responsive incorporates all of the elements that relate to supporting student success mentioned in the previous themes as well as recognizing how deeply embedded the eurocentric values and content is within the U.S. educational system. Work to dismantle the dominant view must be more than just improving representation in course materials (which is still important) but a holistic affirmation of belonging, especially for historically marginalized students, by embedding connections to their own lived-experience throughout the course curriculum.

Quotes from biology instructors currently engaging in curriculum revision using anti-racist and culturally-responsive pedagogies (see Appendix D)

Opportunities for Growth and Support

Surveys suggest that instructors are trying to take many of the recommended steps to support student success. Annual student pass rates for 2020-2021 at 80%, which is slightly higher than the total pass rates for the preceding four academic years (see Figure 2) which suggests that the efforts of faculty to support students in the remote learning environment were successful. Caution should be used in comparing pass rates before and during a major pandemic. Additionally, while the total pass rate was higher for 2020-21 compared to previous years, not all biology courses showed the same increase. The following courses showed a drop in student success: 112, 122, 141, 142, 212, 213, 222, 233 and 234. Small drops in the percentage of students passing in low enrollment courses may not be indicative of important changes. However, BI 112 is such a high enrolled class, that even the slight drop in a class that shows consistently low success rates for students warrants further work.

While the overall number of students enrolled actually increased in 2020-21 compared to the preceding four years, we know some populations of students have been disproportionately impacted by the pandemic and may not be enrolled. The percentage of students enrolled who identified as Native American, Black, Native Hawaiian/Pacific Islander, White, Multi-racial and International dropped slightly in 2020-21 compared to 2019-20, while the percentage of students who identified as Asian or Latinx, increased. Remote operations may have also shifted our demographics in other ways. Anecdotally, some instructors report a sense that we were seeing more highschool students and others more students who already have college degrees, taking advantage of the remote access. One instructor noted, “It feels like I am teaching different students during remote instruction”. Therefore, for many reasons these numbers should be considered carefully.

While it looks like we have had some success supporting students we do not know how broadly these student-centered practices have been implemented across the SAC. If we

did identify the differences between instructors, it would be very useful to know which of the many practices identified have the most impact to be able to focus professional development on these areas. We also need to better understand the barriers to implementing best practices.The scholarship of teaching and learning literature provides some guidance but we need to spend some time talking to each other and getting direct student feedback (qualitative data). We can identify some key questions to ask that would inform actions to be taken to understand/address lower success rates:

- How much variation is there between instructors?
- Which student-centered practices have the highest impact?
- What is the experience of students particularly those from communities that have been historically marginalized?
- Are there opportunities to work with the identity-based student equity centers (like the Multicultural Center) to better connect with the student voice?

We also need support to more fully implement those strategies we already know are high impact for students. Some of the barriers are related to simply having the time to develop and implement best practices, other barriers are more complex and would require additional professional development/facilitation. It is also crucial to keep in mind that to be meaningful high pass rates must be connected authentically to achieving course outcomes. It is important to be cautious about connecting instructor pass rates to best available instructor criteria. High pass rates don't necessarily align with best practices. Best practices are what lead to successful achievement of learning outcomes, skills and competencies, in addition to acceptance into a transfer/professional program or completion of other student goals.

Time and Technical Expertise

For example, the OER BI 231-233 lab manual was created but is not accessible.- if we could have a person like our STORI support help with this conversion --- modify HAPS objectives to provide guidance to all 231-233 instructors for one-college consistency, and could be used as study guides for students to increase transparency about content assessment .

Creating a Supportive Culture for Innovation

We have intra-SAC barriers to implementing new strategies-some SAC members have criticized other SAC members for innovation. It is not clear whether the concerns are because the strategies were new or if there were concerns about how the course objectives would be achieved or if there were fundamentally different teaching philosophies. We need a chance to talk about our differences in a constructive, asset-based, student centered way. The lack of job security for part-time faculty may be

a barrier to creating the kind of environment where faculty can take the risks needed to advance our goals. Students can be resistant to change when we try new things.It is important that Deans and FDCs are cognizant that student evaluations can be 'worse' and students sometimes complain (i.e. flipped classes) when instructors try new things. We need to be able to try new things safely, in the spirit of continuous improvement with a commitment to high quality student-centered learning. We need additional professional development in assessment and teaching to achieve these goals.

We also have barriers to communication within the SAC that currently does not feel welcoming to all members, particularly for those with marginalized identities. If we are going to create a sense of belonging in our classrooms it is critical that we work towards a sense of belonging in our work environment. We have begun the work to disrupt racial macro and microaggressions and this work must be ongoing.

Realistic One-Year Goal

Engage in Professional Development and SAC Conversations to Create a Working Environment that is Equitable, Inclusive and Respectful

The development of innovative culturally responsive teaching requires a supportive work environment. Initial work has begun to develop a BI SAC communications protocol. We plan to engage with an outside facilitator to continue to develop a SAC culture that supports a just, equitable, inclusive and respectful working environment. Development of an inclusive work environment is a prerequisite to supporting an equitable classroom environment. This professional development should include the topics of racial justice and equity. This foundational work is critical for the conversations the BI SAC needs to have to support anti-racist, decolonizing and culturally responsive classroom practices.

Action: Create Communication Protocol, Access continued professional development on communication.

Measure: SAC climate survey (we have a pre-professional development climate survey from the beginning of this year, we can field a post-professional development survey to learn who did PD and if perception of the work climate has changed)

Enrollment and % Passing By Course and Student Demographics
SEE Gender, Race, and Pell Tabs

2B3. The data may indicate a pattern of inequities (in gender, race, or Pell eligibility) in student enrollment or success. Please clearly explain how your program intends to explore content/curriculum, pedagogy/teaching, course material selection, etc. using culturally responsive teaching approaches throughout the next year. Try to identify a realistic one year goal.

Identifying Opportunity Gaps

The overall relative pattern of success rates in biology by race and ethnicity remained consistent in 2020-21 compared to the four previous years. Students who identified as Black, Native American, Latinx, Native Hawaiian/Pacific Islander and Multiracial had lower than average success rates, while students who identified as Asian, International or White had higher than average success rates. However, students in all racial and ethnic groups had higher success rates in 2020-21 compared to 2019-2 except for students who identified as Black (62.3% 2020-21; 64.7% in 2019-21). The total enrollment for some groups is quite small so it is difficult to interpret the significance of small percentage changes. However, the consistent pattern of lower success rates in historically underserved populations of students strongly suggests the need for more anti-racist and culturally responsive practices inside the classroom, as well as more comprehensive support for students to meet the challenges they face outside the classroom.

For the remainder of this section we will focus on Bi 112 (Cell Biology for the Health Occupations), the highest enrollment Biology course and, over the past few years, the course with the lowest success rates (69.9% for 2020-21.)

Link to BI 112 Pass rates by campus, race and ethnicity, gender, Pell offering.

- Bi112 Pass rates By Race and Ethnicity:
    - consistently lower pass rates for native American Students.
    - consistently lower pass rates for native Black Students.
    - consistently lower pass rates for latinx Students.
    - large (18%) decline in enrollment for Black students in the most recent year (2020-2021)
- Bi 112 Pass rates By Pell Eligibility: Consistently lower (10-15%) pass rates for Pell Eligible students and steady declines in enrollment of Pell Eligible students.
- Bi 112 Pass rates By Gender: Students that identified as Female are passing at rates lower (68.2%) than students identified as male (74.8%), non-binary (77.8%), or unknown gender (72.1%) in the most recent year (all remote). In

past years, there have not been large differences in pass rates between male and female students and we do not see this same inequity in other Biology course pass rates. This may reflect the challenges faced during the pandemic by families caring for young children at home while the schools were shut. Previous research suggests that parents identifying as female are bearing most of the additional burden during the pandemic (Hamel and Salganicoff, 2020). Interestingly this trend did not hold across all of the other biology classes. This raises questions about other ways the population of students enrolled in BI 112 may be different. For example, are more of the Pell eligible students in BI 112 female compared to other classes? What is the parental status, work status or age range of students in BI 112 compared to other classes?

- Bi 112 Pass rates By Campus: Over the past few years, CA and RC have had pass rates that are 5-10% higher than SYL and SE. We are cautious not to overinterpret or ascribe causality considering the numerous factors that could contribute to those differences including variation in instruction or student populations. However, examining standards and practices across campuses could reveal causes of differential success (for example SY and SE campuses use the same lab manual and used the same lab kits for the 2020-2021 remote year, while CA and RC use different lab materials.) Additionally, the campuses have different full-time to part-time faculty ratios. It also may be noteworthy that campuses with higher pass rates are the campuses with fewer FT faculty supporting a high campus SFTE. Further considerations regarding the relationship between pass rates and student success are explored in Section 2B4.

Identifying Strategies to Close Opportunity Gaps

The quantitative data that documents the opportunity gap that exists in our classroom needs to be augmented with qualitative data that connects us to the humanity of each student's story. The categories of race and ethnicity are aggregates and do not identify differences between groups that may inform strategies for support. They also do not give us critical information about how students are experiencing our classrooms. It would be useful to

- Collect student stories possibly through entry and exit surveys
- Connect with students who do not persist to hear their stories

Students who were unsuccessful may not be willing to speak freely. Alternative strategies could include

- Engaging with mentors such as Joshua Mead from Future connect

- Resource center mentors and advocates who may have experience hearing student stories

We are also aware that higher pass rates may not be the best measure of student learning. **It is critical that those high pass rates reflect student achievement of course objectives** so that we are setting students up for success for the educational goals they identify for themselves. We could look at the in-course assessments and whether the assessments accurately assess student learning. This could include documenting formative assessments that instructors use. We need to be able to distinguish between gains in pass rates that are due to increased student achievement and those that are artificial because of grade inflation. One instructor commented, “We need to focus on equity paired with excellence”.

One of the challenges/concerns identified by SAC members over the past year was how we as a group understand our responsibilities to the students. “Rigor” is a word that comes up in discussion often. For some the term ‘rigor’ is an exclusionary concept that promotes hierarchical, inflexible ways of teaching. For others ‘rigor” is a term that relates to the concept of what constitutes a high quality STEM education and goes hand-in-hand with flexibility, asset-based and culturally-responsive instruction, and innovation to address opportunity gaps. We need to join together in some hard conversations about the assumptions we bring to discussions of what it means to provide a high quality education: the intent versus the impact on students. Individual professional identities as biology instructors are informed by the STEM culture in which we were each trained and by each instructor’s level of engagement with the efforts to reform undergraduate biology education nationally. What are the opportunities to create a more just, equitable, and inclusive learning culture that fulfills the promise of the PCC mission statement? Some of our courses are high stakes for students in terms of achieving their career goals and so how we engage with what it means to have high expectations and standards is critical. We should be focused on what our students need to be successful. We need support for a forum (such as a professional learning community, PLC) to address some of the following questions:

- Can we identify practices that support both content acquisition and flexibility?
- What are the outcomes and skills that our students need for professional programs? We need to revisit these by interfacing with nursing, radiology, and professional programs and incorporating these conversations into our regular revision of our CCOG’s.
- How do we perform the ‘typical tasks’ such as proctored exams, papers etc., while using an equitable lens to help all students succeed?

Quotes from biology instructors planning to engage in curriculum revision using anti-racist and culturally-responsive pedagogies (see Appendix E)

Realistic One-Year Goal

Create Professional Learning Communities by Sub Discipline to Explore Culturally Responsive Teaching Strategies

The development of successful culturally responsive teaching strategies specific to the needs of a particular class is a process of continuous improvement. We benefit from the conversations we have with colleagues that teach the same classes at other campuses but the time to do this is limited at SAC meetings. It would be beneficial to create professional learning communities (PLCs) that brought together instructors teaching the same class from across the college to identify issues, process new ideas, and innovate culturally responsive teaching strategies. We need biology specific discussion because our equity training is general and not biology focused.

Action: PLC engagement around ADU questions related to Culturally Responsive Teaching

Measure: Number of faculty involved, and report out of discussions/project to be captured in a Google doc for download into next year's ADU.

2B4. What support does your SAC need to fully explore inequities in enrollment or student success? For example, are there any other data reports you would find useful to have related to student success?

Data Reports to more Fully Explore Inequities in Enrollment or Student Success

In general the SAC would benefit from more granular data, including pass rates that could be disaggregated by

- Instructor
- Student Age
- Student Work Status (full-time, less than full-time, multiple jobs etc)
- Parental Status
- Intersectional categories e.g. Race and Gender or Age and Gender or Campus and Race or Campus and Pell Status, Gender, Race and Pell Status

Relationship between prior course/override and course success

- Relationship between overrides and course success
- Relationship between meeting pre/corequisties with Chem 151 competency exam and course success

- Correlation between a BI 112 override and likelihood of a student having to repeat a BI 231-233 course

Transfer or Professional School Success

- Completion of BI 231-233 series and continue on to professional health programs

Additional Life Challenges for Students

- Not captured in our data is the increased student distress seen this year. Students who do not have or who have lost access to support (family/friends, healthcare, financial, stable housing), regardless of background, probably make up a huge portion of the students who did not successfully complete BI 112 this year.

Faculty continually express how crucial it is to have more meaningful measures of success that go beyond pass rates. **To be meaningful, high pass rates must be connected authentically to successful achievement of learning outcomes, skills, and competencies**, in addition to acceptance into a transfer/professional program. There is a dire need for longitudinal data tracking. We need to know if our students successfully transfer into their intended programs and if our curriculum and assessment strategies are preparing them for successful completion of those programs. Section 2B2 begins to describe some of the real-life challenges our job-insecure majority faculty face, when it comes to pass rates, student reviews, enrollment, and the ability to adopt new pedagogical practices. For many reasons, **it is problematic to link instructor pass rates to best available instructor criteria.**

It would also be useful to correlate student success data to the granting of prerequisite overrides by advising. A concerning trend faculty have noticed recently is that more students are receiving prerequisite overrides from advising, for reasons other than having taken an equivalent prerequisite course. One instructor noted that half of their BI 231 students during Fall 2021 received prerequisite overrides from advising without consulting the instructor. Faculty worry this unfairly leaves students without the foundational knowledge necessary to be successful, possibly resulting in the student having to repeat courses or leave their academic plan after blaming themselves for failure.

SECTION 3: REFLECTION ON ASSESSMENT OF STUDENT LEARNING

3A. Assessment Reports

Please note: The following questions link directly to your Annual Learning Assessment Reports for the Learning Assessment Council. Feel free to cut and paste between this document and your other assessment documentation.

3A1. Which student learning outcomes from your SAC's available courses will you assess this year and will you use direct assessment strategies?
(These can be larger, program-level outcomes or course-level outcomes from your CCOGs).
We will be addressing quantitative literacy through direct assessment using the signature assignment for Bi 231 and the DSAC Quantitative literacy rubric.

3A2. Which courses do you plan to assess this year; how and why will your SAC choose the sections?
The reassessment will focus on students in BI 231. BI 231 is usually the next course in the series taken by students that have completed BI 112. We would expect students later in their academic journey to be achieving at a higher level, which should be reflected in the assessment scores of Quantitative Literacy.

We are planning to collect signature assignment artifacts from every section of Bi 231 across the district. A sample of those artifacts will be scored for the assessment project.

3A3. In general terms, describe the assessment project for the year from implementation to data collection. What steps will you take in carrying out the project?
Our population will be students enrolled in online/remote sections of BI 231 Winter quarter 2022. All students in BI 231 will be given the assessment tool (Bi 231 Gen Ed signature assignment) as a regular homework assignment. We will attempt to collect all the artifacts from every Bi 231 instructor, and assign each artifact a unique identifier. A random sampling method will be devised based on the total number of artifacts and the required sample size. Prior to scoring, the SAC will undergo a normalizing session using sample artifacts and the Quantitative Reasoning rubric. Each of the sampled artifacts will be scored by at least 2 raters who participated in the norming sessions. Inter-rater reliability will be determined after scoring is complete. Data will be compiled and examined for trends.

3B. Response to LAC Assessment Questions:
Please respond to the question below, which relates to your SAC's 2020-2021 Learning Assessment Report to the Learning Assessment Council (LAC).

Commendations: The SAC did a great job with data presentation! The reviewers commend the SAC for focusing on what can be learned from a close examination of student achievement in a foundational course. This is a good example of how to use a signature assignment and the shared GenEd rubric to address specific questions about what students are actually learning across courses.

Members of the SAC appreciate this positive feedback and recognition of the effort expended in carrying out the project and report.

Suggestions: The reviewers would appreciate the inclusion of the Signature Assignment in future assessment reports for context. It is also helpful for reviewers to see details regarding the norming session (including inter-rater reliability).

Apologies for missing the inter-rater reliability piece in last year's report. Analysis of inter-rater reliability will be included in the report for this year along with a copy of the signature assignment. By way of "assignment transparency", perhaps the LAC report form could request that the assessment instrument be included in the report.

Question: How will the SAC investigate possible connections among the lower than expected benchmark results with the disparity for students of color and diverse backgrounds?

We should be cautious in assuming that the two are connected since we know there are many factors, other than academic ability, that could prevent a student from succeeding in a course. But, members of the SAC have some ideas for approaching the question of what is driving that disparity.

One suggestion is to survey students on their sense of belonging one year or one quarter, with a follow-up analysis of the fate of those students in the same quarter or in later quarters or courses (longitudinal data on the same students). Students are expert at understanding their own personal challenges and that information could inform what we can do to better support all students. For the survey to be useful it would need to be well-designed and validated, with a relatively high response rate. The SAC would likely need outside assistance to carry out such an endeavor.

Another suggestion is to look closely at the language in the signature assignment to make it more inclusive and student centered.

It's great to see the SAC asking those important questions and the reviewers want to encourage the SAC to continue looking at student achievement in the assignment and this course. Is there a connection?

We're interpreting this question to mean; equate individual success on the signature assignment with individual success in the class. It seems unlikely that we'd get meaningful numbers from only 50 or so scored artifacts, additionally we would need to

re-link the de-identified artifacts to the original student information sheets. An alternative would be to use the individual student grades on the assignment and relate that to overall grade in the course. In that analysis we would only have one rater per artifact (the original instructor) and it would not directly correlate to the DSAC Quantitative Literacy rubric scores.

Could students be surveyed prior to the end of the courses and before they decide to not continue in the Biology series?

As in the first question, we could distribute a survey, preferably one that was designed and vetted by experts to achieve high response rates and useable responses. The question of whether students "decide" to continue in the series seems muddy. Is the question one of students persisting at PCC, or of persisting within biology, or persisting in Allied Health? A passing grade (C or better) will allow a student to enroll in the next course in the series. But anecdotally, within the allied health track (Bi 112, 231, 232, 233, 234) students earning a C will often retake the course for a better grade. We don't know when students make that decision, or when/if they decide to leave STEM or leave college. Those decisions might be difficult to analyze. A different but also interesting question might be; of the students who are accepted into a professional program, how many enrolled in Bi 112 (or any other course) more than once.

Is there a way to replace rigor (weeding students out) with flexibility to better prepare students for the next courses in the series?

This question elicited much discussion within the SAC. We are aware that this is a thorny issue. A common response was that "rigor" is not the same as "weeding-out." As noted in section 2B3 above:

> "Rigor" is a word that comes up in discussion often. For some the term 'rigor' is an exclusionary concept that promotes hierarchical, inflexible ways of teaching. For others 'rigor" is a term that relates to the concept of what constitutes a high quality STEM education and goes hand-in-hand with flexibility, asset-based and culturally-responsive instruction, and innovation to address opportunity gaps.

It is essential that students passing the foundational courses are actually prepared for their next courses, whether those courses are at PCC, a transfer institution, or in a professional program.

We can be "warmly demanding", culturally responsive, inclusive, and rigorous, with the appropriate support, tools, and training. Instructors are hired predominantly for subject matter expertise, and many are not trained specifically in education and pedagogy. Additionally, learning to develop and implement new strategies, materials, and practices requires a major investment of labor. This presents a workload and equity concerns for faculty, whether on continuing appointment or not.

SECTION 4: ADDITIONAL ACHIEVEMENTS, CHALLENGES or OPPORTUNITIES

4A. Is there anything further you would like to share about your program's achievements at this time?

Achievement: We successfully navigated a year of the pandemic in remote teaching with an 80% student success rate. There is no question there are students we were not able to support but as we reflect on where we could do better, it is very important to reflect on where we were successful. It has been a huge lift and biology faculty and staff have put many hours into continuing to provide high quality educational opportunities.

Achievement: Three STORI funded hybrid courses in biology are approved by QM to run in Winter 2022.

Challenges: Two of the biology courses funded for STORI development were delayed because the instructors found the workload too heavy to bring the projects to completion by Winter 2022. We as an SAC must determine the best ways to incentivize this work because it is one of the most impactful ways instructors can come together with a shared mission to create and foster a workspace of belonging, access, equity, and inclusion for our students during an ongoing pandemic.

Achievement: A team of instructors from PCC and PSU agreed to adopt the same textbooks and align the outcomes for the Principles of Biology Course Sequence (BI 211, 212, 213)

Challenges: The alignment will require revision of course materials, particularly for laboratories. A TIIP grant application has been submitted to support this work. SB 233 may require additional revisions in the future.

4B. Are there any challenges not described above that you would like to note here?

Involvement of Part time faculty in the assessment projects is essential (and requested by LAC and reviewers) yet the amount of funding available for this process is woefully inadequate. More funds are needed to train PT faculty on SAC level assessment and then to actually pay them for the work on the assessment projects. This is one of many equity issues that must be addressed because it is an issue of productivity and overall workload for the SAC as a whole. If we can't pay PT colleagues to participate, this increases the workload for FT faculty and we lose the valuable input of the majority of our colleagues.

Currently, our SAC is not functioning as a welcoming place for several BIPOC and/or Part-time faculty. Several members of our SAC have expressed that we are not creating a community that allows all members to feel secure enough to take the risks required for the growth needed to more equitably support our students. Because these issues have not been adequately addressed in the past, despite requests from SAC members to administrators for help, many of us now believe that we need professional facilitation from outside the PCC organization to help the SAC develop more equitable practices and communication between faculty. This will likely necessitate mandatory training for all members of the SAC and that this training be robust and deep. To facilitate success and full participation in these training sessions, we'd like for administration to consider strategies that would create the time for all faculty to participate (i.e. stipends for PT faculty, release time for FT faculty, and/or temporarily release SAC from other responsibilities during the terms of this more intense training. This is one of our biggest barriers to moving forward at this time.

As we move toward a new normal as we enter a 'thoughtful return' to on-campus classes, we will encounter issues of student access. This is particularly true to classes with field work and/or field trips as a normal component. In the past, students have been responsible for carpooling and/or departments have rented vans to drive students to field locations. We would love to see the college purchase vans that would support field trips in Biology. We know that there are other disciplines that would also be able to make use of these vans to support student participation in these field experiences (Geology and Environmental Studies). If the college is unable to purchase vans for this purpose, finding other ways for more equitable student participation in field trips is needed.

4C. Do you see any opportunities in the near or long term that you would like to share?

The first step in the process of STORI development for Biology Courses is mapping the shared learning objectives to content delivery and course assessments. The current Bi 231-3 Course Content and Outcome Guide does not contain detailed college-wide shared learning competencies. This is a barrier to providing students with transparency of the course expectations. It is also confusing for instructors, who require a precise framework of learning goals to maintain academic rigor and reputation while having the freedom to use their varied strengths, approaches, and lessons toward developing culturally responsive teaching practices. A year-long project, also mentioned in Part 2B2 Opportunities for Growth and Support, is to align Bi 231-3 learning objectives to the Human Anatomy & Physiology Society Competencies. This will create transparency and increase equity and accessibility for instructors and students at PCC and pave the path to developing high quality hybrid classes for our students in the near future. This

will also be useful if this sequence is included in the SB 233 common course numbering initiative.

The BI 211, 212, 213 series was approved by the SAC to be a hybrid course series and apply for STORI funding. This funding was not approved because of the misalignment between PCC and PSU. Now that an alignment agreement between PCC and our major transfer partner is complete, it would be good to revisit the potential to develop a hybrid Principles of Biology series.

Biology ADU 2020-21 Appendices A-E