

Biology Program Review

2016

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Table of Contents

1. Program/Discipline Overview.....	6
A. What are the educational goals or objectives of this program/discipline?	6
A. How do these compare with national or professional program/discipline trends or guidelines?	9
A. Have they changed since the last review, or are they expected to change in the next five years?	9
B. Briefly describe changes that were made as a result of SAC recommendations and/or administrative responses from the last program review.	11
2. Outcomes and Assessment.....	12
A. Course-Level Outcomes.	12
i. What is the SAC process for review of course outcomes in your CCOGs to ensure they are assessable?	12
ii. Identify and give examples of changes made in instruction to improve students' attainment of course outcomes, or outcomes of requisite course sequences (such as are found in in MTH, WR, ESOL, BI, CH, etc.) that were made as a result of assessment of student learning.....	12
B. Addressing College Core Outcomes.....	16
i. Update the Core Outcomes Mapping Matrix.	16
C. For Lower Division Collegiate (Transfer) and Developmental Education Disciplines: Assessment of College Core Outcomes.....	18
i. Reflecting on the last five years of assessment, provide a brief summary of one or two of your best assessment projects, highlighting efforts made to improve students' attainment of the Core Outcomes	18
ii. Do you have evidence that the changes made were effective (by having reassessed the same outcome)? If so, please describe briefly.	19
iii. Evaluate your SAC's assessment cycle processes. What have you learned to improve your assessment practices and strategies?	20
iv. Are there any Core Outcomes that are particularly challenging for your SAC to assess? If yes, please identify and explain.....	21
3. Other Curricular Issues	23
A. Which of your courses are offered in a Distance Learning modality (online, hybrid, interactive television, etc.), and what is the proportion of on-campus and online? For courses offered both via DL and on- campus, are there differences in student success? If so, how are you addressing or how will you address these differences? What significant revelations, concerns, or questions arise in the area of DL delivery?	23
B. Has the SAC made any curricular changes as a result of exploring/adopting educational initiatives (e.g., Community-Based Learning, Internationalization of the Curriculum, Inquiry-Based Learning, Honors, etc.)? If so, please describe.	23

C. Are there any courses in the program offered as Dual Credit at area High Schools? If so, describe how the SAC develops and maintains relationships with the HS faculty in support of quality instruction.. 26

D. Please describe the use of Course Evaluations by the SAC. Have you developed SAC-specific questions? Has the information you have received been of use at the course/program/discipline level? 29

E. Identify and explain any other significant curricular changes that have been made since the last review. 29

4. Needs of Students and the Community 30

A. Have there been any notable changes in instruction due to changes in the student populations served? 30

B. What strategies are used within the program/discipline to facilitate success for students with disabilities? What does the SAC see as particularly challenging in serving these students?..... 30

C. Has feedback from students, community groups, transfer institutions, business, industry or government been used to make curriculum or instructional changes? If so, please describe (if this has not been addressed elsewhere in this document). 32

5. Faculty: Reflect on the composition, qualifications and development of the faculty 34

A. How the faculty composition reflects the diversity and cultural competency goals of the institution.. 34

B. Changes the SAC has made to instructor qualifications since the last review and the reason for the changes. 35

C. How have the professional development activities of the faculty contributed to the strength of the program/discipline? If such activities have resulted in instructional or curricular changes, please describe. 35

6. Facilities and Academic Support..... 38

A. Describe how classroom space, classroom technology, laboratory space, and equipment impact student success. 38

B. Describe how students are using the library or other outside-the-classroom information resources... 40

C. Does the SAC have any insights on students’ use of Advising, Counseling, Disability Services, Veterans Services, and other important supports for students? Please describe as appropriate..... 40

8. Recommendations..... 42

A. What is the SAC planning to do to improve teaching and learning, student success, and degree or certificate completion? 42

B. What support do you need from the administration in order to carry out your planned improvements? 43

Appendix 45

Campus Specific Needs and Requests 45

Research References..... 49

Faculty Presentations at Regional or National Meetings..... 50

Biology SAC Outreach..... 51

Student Research Presented at National Meetings 53

Sample Library Assignment..... 55

1. Program/Discipline Overview.

A. What are the educational goals or objectives of this program/discipline?

The overall educational goal of the Biology Department at Portland Community College is to provide students with a critical introduction to the practice of science. We provide a strong grounding in basic content areas, while also seeking to achieve the institution's core outcomes. We offer courses that prepare non-majors to think critically about the role of science in our society, develop an appreciation for the scientific method and an understanding of the complexity of the living world. We also offer courses for majors preparing for advanced work in the biological sciences that require them to practice and apply the principles of the scientific method. Course work can be used to earn an associate degree and/or fulfill transfer requirements for students pursuing bachelor's degrees in science and/or pre-professional tracks, such as pre-med and pre-dental. The biology department also has a mission to serve students preparing to apply to programs in the allied health sciences such as nursing, dental hygiene, veterinary technology, ophthalmic medical technology and radiography. We also serve other programs such as Biomedical Engineering Technology, Bioscience Technology, Environmental Science and Biology and Management of Zoo Animals (Table 1).

The Biology Subject Area Committee supports the mission and strategic plan of Portland Community College. There are four areas in which the Biology SAC mostly strongly advances PCC's mission. Foremost, the Biology SAC provides high quality education for our students. By offering these courses, we are advancing economic development on campus and in our community. Our SAC promotes sustainability, as well as ensuring that our students have equity of access and that all our students can learn in a place of inclusion.



Program/Discipline Overview

The Biology SAC supports the college's strategic plan with these specific actions:

Access to quality education

- Utilization of inquiry-based learning activities and an emphasis on critical thinking
- Increased transparency and access for students planning to transfer as Biology majors
- Coordination with Chemistry chairs to help coordinate chemistry and biology offerings district wide to improve the ability of students to schedule their sequence courses effectively

Advancing economic development

- Collaboration with the CTE programs that depend upon Biology
- Provide critical prerequisite courses which in turn will support the needs of our students' future employers
- Support the regional economy by providing well educated, skilled workers who have achieved the core outcomes, including environmental and community responsibility

Promoting Sustainability

- Updates to course content to broadly integrate sustainability concepts across the curriculum
- Development of laboratory exercises that model sustainable practices, e.g. waste management

Equity and Inclusion

- Increased focus on the recruitment and retention of underrepresented students in STEM fields
- Increased focus on campus climate issues and issues of equity and inclusion as it pertains to the classroom
- Recruitment of students for partner programs such as LSAMP
- Participation in the BUILD-EXITO grant
- Consideration of cultural competence in hiring of new faculty (including part-time faculty)
- Addressing content issues at the course level
- Development of active learning strategies that integrate concepts relating to equity and inclusion
- Continued efforts to align program goals and teaching strategies with national guidelines
- Continued efforts to assess core and course level outcomes in a meaningful way

Table 1. PCC Programs and courses with biology prerequisites. Courses required for closed programs are not included.

Program	Program Courses with Biology Prerequisites	Biology Prerequisites
Bioscience Technology	BIT 201, 203, 205	(102 or 112), 212, 234
Biology and Management of Zoo Animals	BMZA 105	112 (or 211 and 212)
Dental Assisting	DA 142	College level A&P
Dental Hygiene	DH 129, 130	122 and 232
Electronic Engineering Technology	EET 260	122 or 233
Emergency Medical Services	EMS 240	101 (will change to 112), 231 and 232
Environmental Studies	ESR 204	143
Foods and Nutrition	FN 225	231
Health Information Management	HIM 275	122 or 233
Medical Laboratory Technology	MLT 100, 110	231, 232, 233
Nursing	NRS 141, 142, 323, 230	231, 232, 233 and 234
Medical Professions	MP 135	122 or 233

A. How do these compare with national or professional program/discipline trends or guidelines?

The program goals of the Biology department are aligned with national guidelines. The American Association for the Advancement of Science (AAAS) Vision and Change in Undergraduate Biology Education (2009) is a program supported by the National Science Foundation (NSF), Howard Hughes Medical Institute (HHMI), National Institutes of Health (NIH) and the American Society for Microbiology (ASM). This initiative provides a framework for revitalizing undergraduate biology education and details core concepts and competencies that represent the collective wisdom of what the scientific and biological communities consider vital to a quality science education. The core competencies and outcomes as outlined by Vision and Change are in alignment with PCC Core Outcomes and with our individual course level outcomes as well (Table 2).

In addition, the Human Anatomy and Physiology Society (HAPS), a national organization of teachers of human anatomy and physiology, has detailed outcomes for course content as well as more integrative broader process goals specifically for Anatomy and Physiology courses. The course level outcomes for BI 231-233 content are in line with the HAPS guidelines, and the broader outcomes map well to PCC Core Outcomes (Table 3).

A. Have they changed since the last review, or are they expected to change in the next five years?

The fundamental mission and goals of the BI SAC and departments has not changed since the last program review, nor is it expected to change in the next five years. However, we do see challenges for continuing to meet those goals as well as opportunities to improve our ability to meet the broader goals of the college's mission and to align with the new strategic plan. The ongoing discussions about the possibility of majors at PCC and the statewide discussions of an Associates of Biology transfer degree will be important reflection points for the department in the next five years. Many of our courses are also now part of the offerings that fulfill General Education requirements for students at PCC. As the discussions to reform Gen Ed continue, we anticipate a review of how to best serve that aspect of our educational mission.

In addition, a significant decline in enrollment has presented an opportunity for a critical review of resource deployment on all four campuses. The exciting development of SE from a center to a comprehensive campus has further shifted enrollment patterns. These changes have encouraged the development of more formal communication patterns between chairs to plan offerings to meet program goals on a district rather than a campus level. Biology Department chairs now meet at least once a year to up-date a district wide planning document, and chair-to-chair conversations occur each term during schedule planning, to optimize part-time schedules and to coordinate recommendations for offerings and cancellations to the deans.

Table 2. AAAS Vision and Change (2009) Core Competencies and how they align with PCC Core Outcomes.

Core Concepts for Biological Literacy	Core Competencies and Disciplinary Practice	PCC College Core Outcome that best maps
Evolution	Ability to Apply the Process of Science	Critical Thinking and Problem Solving Professional Competency
Structure and Function	Ability to Use Quantitative Reasoning	Critical Thinking and Problem Solving
Information Flow, Exchange and Storage	Ability to Use Modeling and Simulation	Critical Thinking and Problem Solving
Pathways and Transformations of Energy and Matter	Ability to Tap into the Interdisciplinary Nature of Science	Community and Environmental Responsibility
Systems	Ability to Collaborate with other Disciplines	Communication
	Ability to Understand the Relationship between Science and Society	Community and Environmental Responsibility Cultural Competence Self-Reflection

Table 3. HAPS (Human Anatomy and Physiology Society) Broader Process Goals and how they align with PCC Core Outcomes.

Human Anatomy and Physiology Broader Process Goals	PCC College Core Outcome that best maps
Demonstrate information literacy skills to access, evaluate, and use resources to stay current in the fields of anatomy and physiology.	Critical Thinking and Problem Solving Communication Professional Competency
Approach and examine issues related to anatomy and physiology from an evidence-based perspective.	Critical Thinking and Problem Solving
Communicate clearly and in a way that reflects knowledge and understanding of the human body and demonstrates the ability to adapt information to different audiences and applications.	Communication Cultural Competence Professional Competency

B. Briefly describe changes that were made as a result of SAC recommendations and/or administrative responses from the last program review.

Due to a limited budget, we have not been able to implement many of the recommendations that were made at the time of our last program review. The full time to part time instructor ratio was identified as an issue during our last program review, and this subject continues to challenge our ability to meet our goals. Our full time to part time faculty ratio is par with the school. Although there has been no change, the issue of having a very high percentage of our courses taught by part-time faculty is a concern that we believe needs to be addressed. We take advantage of every opportunity within our system to address the high part time to full time ratio by requesting additional full time positions.

Lack of space and equipment was addressed in our recommendations in our last program review. While district-wide bond construction has provided new classrooms across the district, some issues remain. For example, the new classrooms in the Margaret Carter building on the Cascade Campus have provided additional space. However, due to exterior and connecting doors to other classrooms, noise and disturbance regularly disrupt lectures, and the new rooms provide a less than ideal environment during quizzes and exams. In addition, as we move forward to continue to align with national programs such as Vision and Change, it has become apparent that adequate lab space for inquiry and student experimentation is limited, in part due to very out dated and poorly functioning equipment. At this time, we have not been able to make many of the desired changes to our program because we don't have the resources to update our labs or buy the needed equipment. Below are links to citations that offer further explanation for the reasoning behind these requests and which support our analysis.

<http://www.nabt.org/websites/institution/index.php?p=91>

<http://www.bioone.org/doi/abs/10.1893/0005-3155-85.3.167>

In addition to lack of adequate lab space, some faculty have expressed frustration with the inability to align their courses with the national standards because of other issues such as lab support and appropriate training for our laboratory technicians for the adoption of new laboratory activities and longer-term projects. In addition, those lab techs who are qualified to teach are not allowed to do so on some, but not all, campuses. On those campuses where lab prep staff and lab techs are allowed to teach, major changes to lab exercises and curricula are much easier to implement because the lab staff have a much better understanding of what should be occurring and what tools are necessary. We feel strongly that any lab prep or lab tech that meets the minimum qualifications for instructors should be allowed to teach students in the laboratory. The current policy is inconsistent across the district. On those campuses where the lab prep staff are allowed to teach, their contributions have been instrumental to the overall improved lab experience and instruction of our students.

2. Outcomes and Assessment. Reflect on learning outcomes and assessment, teaching methodologies, and content in order to improve the quality of teaching, learning, and student success.

A. Course-Level Outcomes. The College has an expectation that course outcomes, as listed in the CCOG, are both assessable and assessed, with the intent that SACs will collaborate to develop a shared vision for course-level learning outcomes.

i. What is the SAC process for review of course outcomes in your CCOGs to ensure they are assessable?

This review is an ongoing inquiry. We evaluate and re-evaluate as needed and as circumstances warrant review. Some examples of updates that arose from the review process include:

- CCOGs in 200 level sequence courses were reviewed in response to proposed changes in Math prerequisites.
- All our field work policies in our field courses were reviewed to clarify the possible challenges involved. A field work statement was crafted in response to the requests by Safety and Risk Management. This statement was shared with other disciplines with field courses and modified accordingly.
- Lead instructors for each course meet and communicate regarding course outcomes and assessments. These meetings are usually informal. There is difficulty meeting more frequently and formally due to workloads, schedules, SAC overload and geography.
- Two of our faculty received an IIP grant and revised their course work. They assessed students before and after these revisions to determine outcomes. Their IIP Grant documentation can be found here, in the Google Drive files for the grant work.

ii. Identify and give examples of changes made in instruction to improve students' attainment of course outcomes, or outcomes of requisite course sequences (such as are found in MTH, WR, ESOL, BI, CH, etc.) that were made as a result of assessment of student learning.

Changes made to courses have been driven primarily by course-level student evaluations. Changes have also been made to better address college core outcomes. In many biology courses there has been an effort to improve scoring rubrics for assignments, and to create new rubrics for assignments that formerly had none. As a consequence, students have a better understanding of the expectations and objectives of assignments. Notably, many of the significant curricular changes have been designed and were implemented first by adjunct faculty. Below is an inventory of more specific curricular changes that have been incorporated on one or more campuses across the district, categorized by course or set of courses:

General Biology: BI 101, 102, 103

- The current BI 101 curriculum includes an increased emphasis on critical thinking and reasoning skills. Students are required to use the course textbook to identify biological concepts, make connections with other concepts, and create concept maps illustrating these connections. Students must also identify questions that could be answered with these “mind maps.” This exercise has improved student performance.
- Laboratory activities continue to be updated with an emphasis on case studies and more hands-on experiments. Many laboratory exercises that were formerly conducted as demonstrations have now been converted into research- and hypothesis- driven student exercises. This conversion is on-going. For further information on this conversion, see question 3B. Laboratory manuals for BI 101 and 102 at the Cascade campus have been rewritten with a renewed focus on the use of the scientific method and hypothesis-driven inquiry.
- Term projects for BI 101 have also been updated to promote scientific information literacy among our non-majors students. The “BioInvestigation Project” requires students to generate a hypothesis and then test it over the term. New requirements for the project include finding and interpreting information to support student-generated hypotheses. Student now are required to conduct a literature review prior to hypotheses formulation (rather than after), and the hypothesis must be formed from information gained from the literature. The project now also includes submission of a project proposal, which includes a summary of the articles they have selected. Please see Appendix E for an example of the library assignment which supports the term project.
- Active learning techniques and metacognition e-exercises have been added to lecture instruction, using either the D2L platform or textbook publisher-provided platforms. For further information on these changes, see question 3B.
- Based on results of a cultural competency assessment using BI 102 students, a term project involving the book “The Immortal Life of Henrietta Lacks” was developed to better meet that college core outcome.
- To enhance opportunities for cultural competency practice and to promote a culture of equity and inclusion, faculty at Sylvania developed a pilot exercise for BI 101. Called “The Faces of Biology,” this assignment requires students to identify and describe the accomplishments of a biologist from an underrepresented group. The pilot was later expanded to the curriculum of BI 211.

Anatomy and Physiology: BI 121, 122, 231, 232, 233

- Active learning exercises have been developed for use in BI 231, 232 and 233. These exercises are designed for students to work on outside of class, and support the “flipped classroom” model of instruction.

Cell Biology for Health Occupations: BI 112

- Several instructional changes to BI 112 have been made based on outcome assessments. Results of a communication assessment suggested our students were not developing a clear understanding of scientific communication. The assignment in place at that time, composition of a lab report, did not have the impact on the intended outcome that we desired. Across the district, the lab report has been replaced with activities to develop the skills necessary to read, critique, analyze and understand primary scientific literature. This change also resulted in better alignment with course outcomes.
- In an effort to improve student achievement of course outcomes related to laboratory research investigation, cell physiology and genetics, a new biotechnology-based lab exercise was developed and implemented in BI 112. This exercise requires students to use modern molecular biology techniques to determine their own genetic make-up for a specific trait (the ability to taste a bitter chemical). After successful incorporation at Sylvania campus, the exercise was implemented at other campuses. Overall impressions from the faculty who have adopted this exercise suggest it enhances student engagement with the topics, which results in better attainment of the CCOGs.
- Across the district, changes have been implemented to help students develop critical thinking skills that relate to their own study habits. This has taken different forms at different campuses but general themes include actual points for demonstrating ‘Habits of Learning’ at Cascade, metacognition surveys at RC, and the use of online pre-quizzes (and other elements of flipped classroom), POGIL worksheets, and videos at all campuses. A multi-campus committee with enthusiastic SAC support is currently developing a study skills website with embedded tools to help students navigate their first science class more successfully.
- Revision of the BI 112 lab manual to include more inquiry-based exercises continues at each campus.
- Laboratory practical exams have been added at multiple campuses in order to assess lab skills and to better prepare students for the rigors of Anatomy and Physiology courses.

Principles of Biology: BI 211, 212, 213

- The curricula for BI 211, 212 and 213 continues to evolve as instructors of these courses across the district, have become more knowledgeable and skilled at incorporating active learning in the classroom. Some lectures now have a “flipped” format; students are required to read ancillary material or watch specific videos prior to a lecture, so that they may use that information during lecture to solve case studies or to discuss applications of these topics. Other active learning assignments that require the practice of scientific skills, group problem-solving, decision-making, and in-class concept mapping, have been incorporated into the classroom experience at each campus. Further development and incorporation of active learning is an ongoing process for the Principles of Biology series.
- As a result of a survey of BI 211-213 students, the laboratory exercises have been modified to focus on the use of the scientific method, with the goal of developing a deeper understanding of scientific processes and their benefits. For example at Sylvania assessment of the quantitative literacy aspect of a photosynthesis paper in BI 211 clearly indicated a disconnect between the data the students collected and their ability to interpret the data. The faculty determined that the underlying issue was the limitation presented by the lab protocol. The students were developing hypothesis best tested by measuring a dependent variable that was not appropriate. Subsequent BI 213 students worked on refining this protocols for their independent projects. The BI 211 class that followed was able to use this modified the protocol and the resulting photosynthesis papers seemed to show stronger data interpretation skills. Samples of those papers have gone to the multi state collaborative to be assessed for quantitative literacy. Students from SY and RC have presented work done in class at regional conferences (see Appendix)
- A photosynthesis paper in BI 211 clearly indicated a lack of connection between the questions the students wanted to ask and the dependent variable in lab. This affected class outcomes. Subsequent BI 213 students worked on refining protocols for the independent projects. The BI 211 class that followed the BI 213 used the updated version of the protocol and the resulting students’ papers were much improved. Samples of those papers have gone to the multi-state collaborative to be assessed for quantitative literacy.

B. Addressing College Core Outcomes

- i. Update the Core Outcomes Mapping Matrix. For each course, choose the appropriate Mapping Level Indicator (0-4) to match faculty expectations for the Core Outcomes for students who have successfully completed the course.

Table 4. Updated Core Outcome Mapping Matrix.

Course #	Course Name	CO1	CO2	CO3	CO4	CO5	CO6
BI 55	Human Biology						
BI 101	Biology	3	3	2	1.5	2	2
BI 101 H	Introductory General Biology	3	3	2	1.5	2	2
BI 102	Biology	3	2.5	3	2	2	2
BI 103	Biology	3	1.5	3	1	1	1
BI 112	Cell Biology for Health Occupations	3	1.5	3	1.5	3	1.75
BI 121	Introduction to Human Anatomy & Physiology	3	1	2	1	2	2
BI 122	Introduction to Human Anatomy & Physiology	3	1	2	1	2	2
BI 141	Habitats: Life of the Forest	3	3	3	1.5	2	2
BI 142	Habitats: Marine Biology	3	3	2	2.5	2	2.5
BI 143	Habitats: Fresh Water Biology	3	3	3	2	2	2
BI 145	Introduction to Wildlife Conservation and Mgmt.	3	3	3	2.5	2	3
BI 160	Ecology / Field Biology: Coast	3	2	2	1	1	3
BI 161	Ecology / Field Biology: Great Basin	3	2	2	1	1	3
BI 163	Organic Gardening	3	3	3	2	2	2

Table 4, continued. Updated Core Outcome Mapping Matrix.

Course #	Course Name	CO1	CO2	CO3	CO4	CO5	CO6
BI 164	Bird Identification and Ecology	3	3	2	1	2	2
BI 198	Independent Study – Biology	3	2	3.5	1	3.5	3.5
BI 200A	Principles of Ecology: Field Biology						
BI 200B	Principles of Ecology: Field Biology	4	3	4	1	3	3
BI 200C	Principles of Ecology: Field Biology						
BI 202	Botany: An Introduction to the Plant Kingdom	3	3	2	2.5	1.5	2
BI 211	Principles of Biology	3.5	2	3.5	2	2.5	2
BI 212	Principles of Biology	4	3	4	2	2.5	2
BI 213	Principles of Biology	4	3	3.5	2	3	3
BI 222	Human Genetics	3	2	3	3.5	2	2.5
BI 231	Human Anatomy & Physiology I	3	2	3	2	2.5	3
BI 232	Human Anatomy & Physiology II	3	2	3	2	2.5	3
BI 233	Human Anatomy & Physiology III	3	2	3	2	2.5	3
BI 234	Microbiology	3	3	3.5	3	3.5	3
BI 241	Pathophysiology	3	2.5	3.5	2	3	3
BI 280A	Cooperative Education: Biology	4	2.5	4	3	4	4
BI 287	Introduction to Immunology	3	2	3	2	3	2
BI 298	Independent Study	3.5	2.5	4	1	4	4

C. For Lower Division Collegiate (Transfer) and Developmental Education Disciplines: Assessment of College Core Outcomes.

i. Reflecting on the last five years of assessment, provide a brief summary of one or two of your best assessment projects, highlighting efforts made to improve students' attainment of the Core Outcomes.

SAC members commonly report that they have limited time to conduct all of the necessary assessments, and do not often get useful results from assessments. Moving forward, faculty would like to align with the PCC vision and establish a more formal process and schedule for assessments. Despite these issues, several assessments have provided a valuable platform for encouraging course changes, including the following:

- One of our Microbiology instructors has incorporated a reflective essay based on an assigned reading. The reading concerns a University of Portland Nursing Instructor who teaches ethics. She found that in the real world new nurses frequently fail to correctly follow the protocols and procedures they were taught due to pressure from those with more authority— doctors, supervisors, nurses with more seniority— because they feared they would lose their jobs. These short cuts could jeopardize patient health. Students are asked to reflect on their own feelings in response to the article and to make connections with similar experiences they may have had on the job. They are tasked to find resources that report on the consequences of not following proper procedures (reuse of syringes that transmitted hepatitis C to other patients, for example). Assignments are graded based on a rubric used at Harvard, which has been adapted for this assignment. It can be challenging to create reflective pieces for microbiology, but this level of engagement helps to improve professional competency.
- Microbiology (BI 234) was recently assessed for Cultural Awareness. In this project, we asked questions with regard to the roles that socioeconomics, religious belief, gender, sex, availability to health care and resources such as clean water play in disease transmission and acquisition. The overall outcome indicated that our students are aware of the impacts that these various factors have on the microbiology of individuals. We concluded that students did have an awareness of the ways in which culture affects disease transmission and treatment based on our lectures. However, the students performed only well enough to meet our benchmark (70% correct answers on the assessment tool). Since this assessment, instructors have added additional materials and assignments to place a greater emphasis on the cultural impacts on disease and health. For example, one instructor has introduced a Frontline video about the impacts of Ebola on a family in Sierra Leone. Another instructor now requires students to find news articles about events related to microbiology and related topics from other parts of the world. The students then prepare a presentation outlining the current event and the pathogen at the center of the story. Like the Ebola video, these exercises very poignantly put a face on disease and present the ways that culture influences the identification, epidemiology and treatment of disease.

- Based on a Communication assessment using BI 112 students as artifacts, we learned that the students were not developing the necessary skills to communicate scientific information effectively. It was concluded that the assignment at the time, composition of a scientific paper, did not have a positive impact on the learning outcome. Across the district, the scientific paper has been replaced with a series of assignments and activities to develop the skills to read, critique, analyze and understand the primary scientific literature. Students still carry out hypothesis driven research and compose a lab report, but emphasis in the course has been placed on understanding how scientific communication works. This change also resulted in better alignment with course outcomes. And treatment based on our lectures. However, the students performed only well enough to meet our benchmark at the time of 70% average or better correct on the assessment tool. Since this time, instructors have added additional materials and assignments to place a greater emphasis on the cultural impacts on disease and health. For example, in one section a Frontline video about Ebola has been introduced that focuses on a family in Sierra Leone and the impacts of Ebola on the family. In another section, students are required to find news articles that focus on events related to microbiology and related topics from other parts of the world. The students then prepare a presentation outlining the current event and the pathogen at the center of the story. Like the Ebola video, these exercises very poignantly put a face on disease and present the ways that culture influences the identification of disease, epidemiology of disease and treatment of disease.
 - In 2014-15 we also assessed the Self-reflection outcome in BI 112. We attempted to determine if learning about Bloom's "Taxonomy of Educational Objectives" and different cognitive levels helped students identify different question types on exams. The assumption was that recognizing different levels of cognition would help students adjust their approach to test taking. Although we had difficulty with data collection, we were able to make some tentative conclusions. Based on the pre-test and post- test scores from the surveyed sections of BI 112, a brief homework assignment about Bloom's Taxonomy did not help students identify question types. Therefore, we do not recommend college-wide incorporation of information about Bloom's Taxonomy and/or different question types into Bi 112. We do not plan to use this tool again if we assess Self-reflection in the future.
- ii. **Do you have evidence that the changes made were effective (by having reassessed the same outcome)? If so, please describe briefly.**

The SAC generally agrees that we are not comfortable with the rigor of our assessment process and that we would like a process that produces useable results. We are trained in experimental design and are well aware of the limitations of conclusions based on poorly collected data. We know we have limitations in our current experimental paradigm. However, in the process of grappling with our assessment tasks we have found the discussions with our colleagues valuable and district wide changes to curriculum have been made (see 2aii). When we previously assessed Professional Competency we framed the assessment in terms of being able to be proficient in the scientific method. There are many aspects to this topic and while we did not approach it directly we

did begin to question our students' ability to interpret data. This year we are formalizing that question and our assessment project is centered on quantitative literacy. We have a pilot project to possibly reassess this outcome. In addition to the projects being done at the SAC level, 2 lab sections of BI 211 papers were sent as artifacts to be part of the multi state collaborative assessment at the national level. Knowing that we will not have a high level of resolution within the data that are returned to us, the SAC has decided to take a look at what does come back and discuss whether or not a reassessment incorporating this tool could be done on a broader scale.

iii. Evaluate your SAC's assessment cycle processes. What have you learned to improve your assessment practices and strategies?

A survey of SAC members regarding assessment practices generated the following comments:

- “It feels like going through the motions.”
- “It is hard to get buy-in from all faculty. Paradoxically, it seems harder to get veteran faculty on-board.”
- “A low investment/buy-in leads to weak attempts to assess, and weak data. Garbage in, garbage out.”
- “The assessment process seems to be a chore. I think all (most?) of us are trying to do a better job every term, so maybe the process feels forced or constrained.”
- “Is there a better way than developing these bogus tools/instruments that have no hope of answering the questions we really want to and yielding worthless data that leads to exactly no change at the department/SAC level?”
- “I don't think our assessment practices are very good. It usually ends up being the responsibility of one or a few people. The results are rarely presented to the SAC. They are done on one or a few classes rather than all of the classes. There is not much "buy in" from instructors.”
- “The assessment process is NOT what drives curriculum change. It is busy work and ends up being something else that takes me away from my duties that are making a difference to curriculum and serving students.”
- “I feel that our SAC does a great job of making sure that all core outcomes and all frequently taught courses are regularly assessed. At our meetings we try to choose outcomes that have not been assessed recently, and courses that are due to be assessed. From this, I have learned that it may also be worthwhile to consider that just because a course such as BI 112 was recently assessed for say, critical thinking, that it may be worthwhile to assess the exact same course for some other outcome the next assessment cycle, due to the large enrollment and huge impact that a course such as 112 has.”

It is evident from the responses that the SAC is struggling with the assessment process. We acknowledge that the format of the assessment document has changed, and that the supporting role of the LAC has also changed. Hopefully these changes will move us in the direction of better assessments.

We understand the importance of assessing student learning. In an effort to make our assessments more valuable, and to get greater buy-in from faculty, we have agreed to try improve the experimental paradigm. The tools we hope to utilize include our assessment coach and some of the excellent models available based on other SAC projects. Adoption of the Vision and Change model will be useful in part because there are discipline specific rubrics available for the Vision and Change core competencies that map to the College's core outcomes. We are hoping that nationally vetted rubrics already in our discipline specific language will help focus our efforts. One of the limitations has always been the tension between including part time instructors, which are by far the majority, and being respectful of their time. We are extremely hopeful that the recent changes that affect part-time faculty (e.g. 15 new multi-year contracts in Biology this year) will be positively reflected in the participation of Part-Time faculty in this process.

iv. Are there any Core Outcomes that are particularly challenging for your SAC to assess? If yes, please identify and explain.

The SAC has identified the outcomes of self-reflection, professional competency and cultural competency as challenging to assess. A common feature of these outcomes is the lack of benchmarks for comparison. The courses within the BI SAC are largely information and content-driven, and as such, are pre-disposed to direct assessment methods that do not fit well with the strategies needed to assess self-reflection and cultural competency. Furthermore, we have found that because many of our courses are taught by job insecure faculty, participation in and preparedness for assessment is inconsistent.

Professional competency is particularly challenging as we do not have any programs that directly prepare students for a career. Many of our courses serve as pre-requisites for professional programs, and we do not train students to master their professional activities. In our courses, it is difficult to define professional competency, and therefore difficult to assess.

Individual responses to a survey of SAC members regarding assessment challenges are included below:

- “I am participating on the assessment committee charged with exploring critical thinking skills in students who have had BI 112, and are now taking BI 231. I have found this to be quite challenging, as in general, critical thinking is a difficult characteristic to assess, and our scoring of this skill may have been somewhat subjective. Also, because this was the first assessment any of our committee members had participated in, there was a learning curve on our end. If we reassess in the near future, I think we will all have ideas of how to improve our assessment document provided to the students, so that the results can be analyzed in a less subjective manner.”

Outcomes and Assessment – College Core Outcomes

- “I think they are all hard to assess beyond an individual’s growth.”
- “Overall though: for many of our classes it is a bit of a stretch to include cultural awareness; we are teaching biology; but are usually focused on the organisms/cells and not worried about how they are involved in culture.”
- “For many classes communication is not emphasized although we expect our students to communicate. Self- reflection is also not a major component of our courses; although some students do intense self-reflection as they struggle through; and many don't. It is not an explicit part of my classes.”

3. Other Curricular Issues

- A. Which of your courses are offered in a Distance Learning modality (online, hybrid, interactive television, etc.), and what is the proportion of on-campus and online? For courses offered both via DL and on-campus, are there differences in student success? If so, how are you addressing or how will you address these differences? What significant revelations, concerns, or questions arise in the area of DL delivery?**

Since 2011, about two percent of our CRNs have been offered in DL or hybrid formats. Five different biology courses are offered in both on-campus and DL formats. Pathophysiology (BI 241), Human Genetics (BI 222), and (starting in summer 2016) Introduction to Immunology (BI 287) are offered in the DL format (in addition to the existing on-campus format). General Biology (BI 101, 102, and 103) is offered in a hybrid format, which combines weekly on-campus recitation, testing, and labs with online learning. Of our DL courses, BI 101, a course taken by many students to fulfill their general education requirement, is offered most frequently. For example, of the 16 DL courses offered in 2013-2014, 10 were BI 101.

The relative pass rate for student's on-campus vs DL classes in biology varies between classes, years, and campuses. However, from Fall 2012 to Spring 2014 (the period for which we have data) there was little difference between the percentage of students who passed on-campus classes (approx. 75%) vs DL classes (approx. 74%) (Institutional Effectiveness).

Biology only offers fully DL courses for non-laboratory courses. The Biology SAC has adhered to a policy of offering only the hybrid format for laboratory classes, reasoning that safety protocols and comprehensive laboratory skills would be impossible to replicate outside a monitored biological laboratory setting. Many of our students will enter work environments where rigorous safety protocols, equipment usage and laboratory skills are required. Therefore, it is essential that they learn these basic skills in an instructor-guided environment where the instructor can carry out formative and summative assessments of these skills.

The biology SAC maintains a policy that all exams and laboratory quizzes (for DL and face-to-face courses, alike) must be administered and proctored on campus.

- B. Has the SAC made any curricular changes as a result of exploring/adopting educational initiatives (e.g., Community-Based Learning, Internationalization of the Curriculum, Inquiry-Based Learning, Honors, etc.)? If so, please describe.**

The members of the Biology SAC strive to keep abreast of national and local educational initiatives, such as those that promote better teaching and learning in the Life Sciences. For example, national Vision and Change recommendations have been made by a consortium of educators, led by the National Science Foundation (NSF) and the American Association for the Advancement of Science (AAS). The NW regional organizations, PULSE, and NW Bio Consortium work to implement these changes locally. Related to the goals of Vision and Change are initiatives such as that of the Council for Undergraduate Research (CUR) to promote integration of undergraduate research in teaching. PCC is a partner in an offshoot of CUR, the NSF funded

Other Curricular Issues

Community College Undergraduate Research Initiative (CCURI). In addition, Biology faculty members who teach courses that serve our pre-Allied Health program students keep closely apprised of national recommendations such as those of the National Academy of Sciences regarding the meeting of course outcomes for this important demographic of students. In short, the Biology SAC explores and implements change as appropriate, via both curricular (outcomes) changes and development and implementation of novel teaching materials and methods. Some examples to illustrate our Biology SAC's implementation of new initiative- driven curricular and teaching improvements are organized by topic below.

Inquiry-based learning

Inquiry-based learning is used in both laboratory and lecture components of our courses. When using inquiry as a lens for learning, students practice critical thinking, communication, collaboration, and interdisciplinary thinking.

- Case Study usage has increased in lecture and laboratory sections of BI 101-103, 121, 122, 211-213, 231, 232, 233 and 234.
- The majority of our Biology laboratory courses include inquiry-based hands-on learning activities.
- POGIL (Process Oriented Guided Inquiry Learning) techniques have been developed for BI 112 and BI 121-122.

Undergraduate Research (UR)

- At Rock Creek, we have not changed the curriculum, but are implementing innovative strategies for teaching our existing curriculum outcomes as a result of initiatives catalyzed by CCURI (Community College Undergraduate Research Initiative) and PULSE Vision and Change. In Principles of Biology, we created inquiry (research) labs that use either case studies or real world questions as the foundation for student learning. These updated labs are based upon existing lab modules so only minor changes to lab preparation are needed in order to accommodate the new approach. For example, in 211, we use the first part of a published amylase enzyme lab to teach students basic techniques, but then students are given a real world scenario and are asked to design and carry out preliminary experiments to answer other questions. Another example of this shift in focus at Sylvania is the development of an inquiry-based photosynthesis lab. Using existing protocols and equipment, students develop a research question based on the existing literature, which they then test in lab. The direction of inquiry comes from student-generated questions about the development process in the photosynthetic apparatus.
- An example of an interdisciplinary UR approach was a modification of the bacteriology lab module in BI 212. Students test antibacterial properties of essential oil compounds that are extracted by students in the Rock Creek organic chemistry class. Students at Sylvania and Southeast are investigating the antibiotic properties of honey and tea tree oil.

Other Curricular Issues

- Independent research projects: we have sponsored about a dozen BI 198 and 298 students in the past few years. These 198/298 projects are serving to inspire and support new ideas and materials that can be used in the regular classrooms. For example, fern DNA that had been prepared by a BI 198 student for bar coding projects has been used by BI 212 students who are learning about gene expression and phylogeny.
- Principles of Biology courses include research projects at all campuses. Students in 211-213 are now conducting research by using the process of science. They ask a scientific question, gather information from the primary literature, and design the parameters of their own experiments (rather than performing prewritten experiments). Students run their experiments, collect data, and write scientific papers. Collaborative teamwork is modeled after the methods used by professional scientists.
- Principles of Biology I (BI 211) instructors work with their campus librarians to ensure students receive current library instruction at the start of each term, to support their research projects and scientific writing.
- Peer review is presented as a topic, and then practiced by students during our Principles of Biology I courses at each campus.
- Trail cameras are used in BI 141 – Forest Biology. Results are analyzed by students and shared via the PCC website.
- Development of a new BI 199 – Methods in Biological Research. The course did not persist due to low enrollment.
- Students attend the Oregon Academy of Sciences, Pacific University undergraduate conference, and the CCURI research poster conferences, so they can see their peers present their experiments and perhaps even present their own.

Honors Courses

- Honors section of BI 101 are offered across the district. Effectiveness of the Honors sections is dependent upon enforcing Honors requirements. In our experience, this has not been the case, and students are enrolling in Honors sections without meeting the minimum requirements. The Honors course incorporates a Northwest Earth Institute discussion course (A Sense of Place), which allows a deeper discussion and exploration of some of the topics.

Internationalization of Curriculum

- In Principles of Biology (211-213) at SY, instruction and information from a CIEE (Council on International Educational Exchange) trip to China are used. Internationalization has led to certain biology topics having international components or examples to help understanding of the importance of these topics. Topics range from population biology, soil conservation, sustainable agriculture, ecological succession and agriculture, to ethical issues around

Other Curricular Issues

genetics and genetically modified organisms. Using perspectives from other cultures is useful for understanding the topics at hand and their inter-connectedness with biology.

- Information from a CIEE trip to Africa and a sabbatical trip to Cuba has been incorporated into BI 102 and BI 163-Organic Gardening.

Community-based learning

- At Sylvania, community-based learning has been incorporated into many Biology 101 labs (10 hours) and Biology 213 labs (20 hours). Biology 211 and 212 have optional smaller components (2-3 hours) for community-based learning. Students are required to describe and reflect on how biology is used in the organizations for whom they volunteer.
- At Rock Creek, Biology 213 has a community-based learning component. One of the main goals of this project (in addition to service) is to help students explore career opportunities and get networking opportunities. Several of our students have acquired jobs through these experiences.

C. Are there any courses in the program offered as Dual Credit at area High Schools? If so, describe how the SAC develops and maintains relationships with the HS faculty in support of quality instruction.

We meet with High School faculty on a regular basis under the auspices of the Dual Credit Program for professional development. These meetings are formal and are organized by the Dual Credit Office.

All high school instructors are formally evaluated on a regular basis by PCC Biology faculty who travel to the high schools and assure that the curriculum and equipment align with our standards. The high school faculty also reaches out to the PCC instructors (usually Dept. Chairs) on an informal basis to get specific questions answered regarding their courses.

The schedule of required assessments of the high schools is not easily accessible. We would like the assessment schedule to be added to Banner, so that we can be alerted when an assessment is due. Dual Credit has recently hired two new people and we have been told to look forward to improvements soon.

The SAC would also like to stress our concerns about some of the changes that are currently moving forward. The SAC has concerns about the “instructor of record” model. The SAC strongly believes that every instructor who delivers a PCC course curriculum at a high school should meet the same qualifications and should have the same level of credentials as the PCC faculty to teach any particular course. We are concerned about maintaining the ability, as content matter experts, to identify and ensure teacher/instructor qualifications. We are committed to the dual credit program, but are also strongly committed to the rigor at which our PCC Biology courses are maintained.

We also request guidance on individual courses that are not taught on every campus (such as BI 141) so one instructor is not responsible to perform all the assessments. A significant increase in the number of dual credit offerings as regional high schools, creates a higher workload for our few

Other Curricular Issues

faculty involved in mentoring and assessments (Table 5, Figure 1). We will need additional support to continue with this work.

Table 5. High Schools, Instructors, Dual Credit Courses and Assigned PCC Faculty

High School	H.S. Faculty	Dual Credit BI Courses	PCC Faculty Contact
Sherwood	Lance Thurman	101, 102, 103, 121 and 122	Marilyn Thomas - SY
Tigard	Michael Weitzhandle	101	Marilyn Thomas - SY
Beaverton	Ron Romanick	121 and 122	Marilyn Thomas - SY
Alliance	Joe Ferguson	141 and 164	Micah Jordan – CA
Grant	Amy Lindahl	101 and 102	Micah Jordan - CA
Aloha	Colleen Swihart	101 and 102	Kevin Lien – RC
Banks	Carol Pallett	101 and 102	Kevin Lien – RC
Forest Grove	Ben Crabtree	101 and 102	Kevin Lien – RC
Hillsboro	Brian Nauert	101, 101H, 102 and 103	Kevin Lien – RC
Life Christian	Erik Neill	101, 121 and 122	Kevin Lien – RC
Life Christian	Holly Neill	101	Kevin Lien – RC
Valley Catholic	Amy Lacks	101,, 102 and 103	Kevin Lien – RC
Central Catholic	Kathryn Frederick	121	Debby Machuca - SE
Madison	David Valenzuela	121 and 122	Debby Machuca - SE

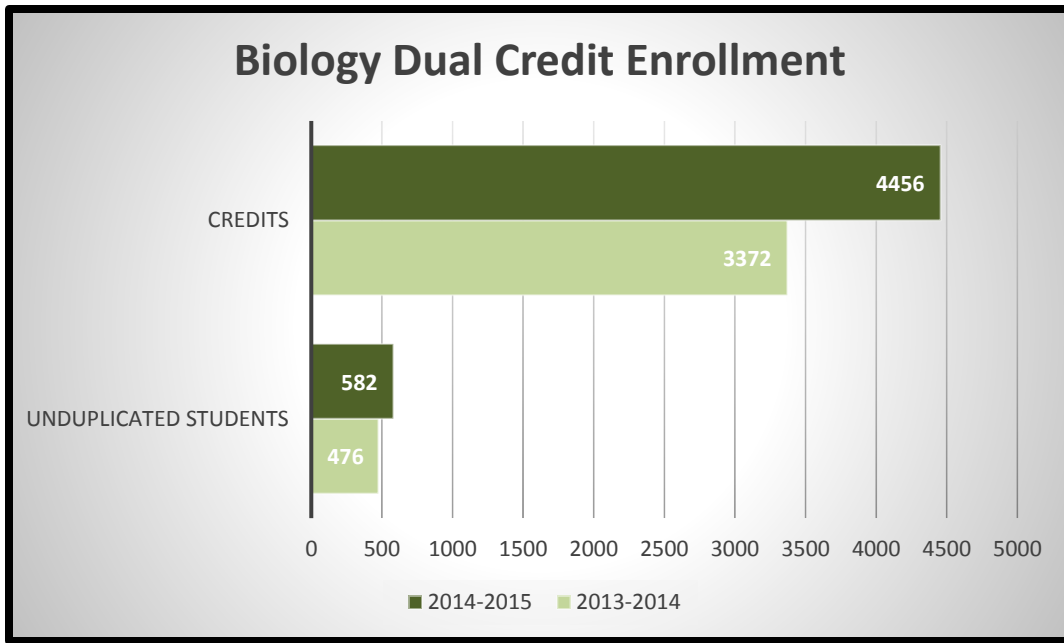


Figure 1. Dual credit enrollment during the 2013-2014 and 2014-2015 academic years. The numbers of students enrolled in dual credit courses is expected to continue to increase.

D. Please describe the use of Course Evaluations by the SAC. Have you developed SAC-specific questions? Has the information you have received been of use at the course/program/discipline level?

SAC specific questions for course evaluations were developed, and several of these were composed to align with College Core Outcomes. Additional questions address the use of textbooks, safety issues in lab, proper use of equipment in lab and availability of materials and equipment in lab.

At this time, the data have not been formally analyzed and no discipline level changes have been made based on course evaluations. However, feedback has prompted SAC members to suggest and adopt new textbooks, revise laboratory exercises and acquire new laboratory equipment.

Based on comments from SAC members, course evaluations are useful to individual instructors and department chairs. Of the questions on the assessment, the SAC specific questions that align with the College Core Outcomes seem to be the least helpful. However, the recent implementation of the 'grade hook' to increase student participation in this process may provide an opportunity to make this information more valuable.

E. Identify and explain any other significant curricular changes that have been made since the last review.

Several other changes have been made to courses across the district, including the following:

- A new lab using molecular biology techniques that connects human genetics with biotechnology has been designed and implemented in BI 112 across the district.
- The use of lab practicals has been adopted for BI 112 at select campuses.
- The math prerequisite for BI 112 was changed from MTH 20 to MTH 65.
- Math pre-requisite for BI 121 was changed to MTH 65.
- Reading and writing pre-requisites for BI 121 were changed to “WRD 121 readiness”
- A pre-requisite for BI 121 has been changed to “C or above in MTH 65 and Biology 121”
- BI 164, Bird Identification and Ecology, is now a general education course.
- CCOGs for BI 145 have undergone major revisions
- The CH 151 exam has been added as an alternate pre-requisite for BI 211

4. Needs of Students and the Community

A. Have there been any notable changes in instruction due to changes in the student populations served?

We do our utmost to understand the needs of student populations, including students with disabilities, veterans, LGBTQ students, and others, so that we can serve them best. Several changes to instruction have been implemented, including the following:

- Exercises have been developed in several courses to increase computer and internet literacy.
- With an increase in students being served by Disability Services, there have been significant changes made to laboratory practical exams in A&P courses to better serve those students with academic accommodations.
- In response to increasing numbers of Veterans, attention has been given to potential triggers related to PTSD.
- Curricular changes have been made to BI 121 and 122 to better serve medical assisting students.
- A&P labs have been updated with more visual materials to better serve a wide variety of learning styles.
- Universal design and accessibility of course materials has been addressed in several classes.

B. What strategies are used within the program/discipline to facilitate success for students with disabilities? What does the SAC see as particularly challenging in serving these students?

The Biology SAC is using several strategies to facilitate success for students with disabilities. Of note is the fact that we have encouraged more dialogue between our SAC (and individual campuses) and Disability Services. As a result, we think we have a better understanding of our students' needs.

Other strategies we use include:

- Alternative assignments for optional field trips.
- Formatting of visual materials so that they are accessible.
- Using captioned videos
- Using a lecture-capture software program
- Taking pictures all the models and specimens that we use in the practicals in Principles of Biology and Anatomy and Physiology.

The Biology faculty (at the SAC, departmental and individual levels) has been working more closely with Disability Services to ensure all our students get the accommodations they need to succeed in our classes. However, due to the unique nature of some of our courses, we still have several challenges.

- **Laboratory Practicals**

Laboratory Practical exams are hands-on, timed exams that require students to identify certain organisms, tissues, organs, and cell types. These types of exams are common in many biology classes but are integral to the Human Anatomy and Physiology courses. Most campuses have very limited lab space. For example, at Rock Creek, we only have four dedicated lab rooms for our entire department (and we share these with three CTE departments). As a result, there is very little time between classes. It is already very challenging for instructors to set up these exams in the limited time and space they have. It is at times impossible for instructors to give DS students extra time to work on an exam because the classroom is in use by another class. With the best intentions of all parties, we have discussed several alternatives with Disability Services but each alternative presents a new set of problems. For example, we now have pictures of all of our models, dissections, and slides to allow students to take a “picture practical”. While this allows students the extra time they need, many faculty feel that the difference between pictures of a specimen and the specimen itself is too great. In addition, a student may not have the same views of a specimen regardless of how carefully we take the picture.

- **Availability of DS proctors and testing centers/PT compensation**

Most of our night and weekend classes are taught by PT faculty. These are the times when DS proctors are not available and the testing centers are closed. This leaves many of our part-time instructors in the difficult position of being required to accommodate students with no support. In addition to these challenges, our part-time faculty are not compensated for this extra time they spend outside of the classroom. While there may be limited help available at the departmental or division levels, this problem is systemic and one that we hope is addressed.

- **Interpretation of “reasonable accommodations”**

Several instructors have reported that their opinion of what is a “reasonable accommodation” is not being heard or understood by DS. In particular, use of calculators and word lists are often seen as unreasonable by instructors because of the nature of the course. We invite counselors for some DS students to sit in our classes so that they better understand our courses.

- **Field classes**

Fieldwork is a clear challenge for some DS students. Sometimes students do not understand the amount of outdoor fieldwork that some biology classes and some sub-disciplines require. The SAC is currently assessing the types of physical tasks and outdoor work needed for “professional competence” and how these types of work can be modified to accommodate DS students. The SAC is also working on clarifying student expectations by including more course descriptions and modifying CCOGs. Possibilities for accommodating a student in a field class include a personal aid assigned by the DS office, special appointment times for the field experience, or computer work for supplementation.

C. Has feedback from students, community groups, transfer institutions, business, industry or government been used to make curriculum or instructional changes? If so, please describe (if this has not been addressed elsewhere in this document).

Most transfer students who complete our biology majors series (Principles of Biology: BI 211-213) transfer to Portland State University. We have been working closely with biology professors and the biology program manager at PSU to address two key issues our students face.

First, our series is not in alignment with PSU. This is not unusual in Oregon. However, it can be a problem for students who take part of the series at PCC and who then transfer to PSU (and vice versa) because they will miss some information. This problem can be resolved if we allowed transfer of the whole series, not individual courses within the series (e.g. our transfer agreement with OSU). However, we would prefer to align with PSU to better serve our students. To that end, we have met several times with representatives from PSU. They are in the process of reworking their entire program and expect it to be complete by Fall 2016. We will need to examine their new curriculum to determine whether or not alignment between our programs will be possible. If not, we will suggest that only the entire series can be transferred between institutions.

Second, many of our biology students who receive their AAOT cannot complete their B.A./B.S. at PSU in two years. Based on information from the PSU biology program manager, Leah Tuor, we estimate that this affects approximately 30 students each year. To help students complete their B.A./B.S. in two years, Jaimie Powell has worked with PSU advising, PCC advising, and Oregon Metro Connect. They designed an advising sheet for biology students to complete the AS degree at PCC. This was distributed by email to all Principles of Biology students. The guide was presented at a PCC Advisors meeting and was sent to all advisors. Advisors at PSU were also given the guide. Leah Tuor is also holding informational sessions and is meeting with PCC students before they transfer. In Fall 2015, she advised 13 PCC students who contacted her based on the information they received in the email.

Several Oregon community colleges (including PCC) are currently working together to design an ASOT-Biology to help our students transfer easily between any Oregon community college and any Oregon university. In addition, there has been a push to design specific majors at PCC, which could also help our students transfer to university more easily. We are supportive of

Needs of Students and the Community

both of these ideas and will continue working with these groups to support all Oregon transfer students.

5. Faculty: Reflect on the composition, qualifications and development of the faculty

A. How the faculty composition reflects the diversity and cultural competency goals of the institution.

The Biology SAC has a commitment to increasing the diversity and cultural competency among its faculty members. Currently, however, our faculty composition does not reflect the ethnic diversity of the student body.

We recognize that diversity is essential for progress in science, that learning is idiosyncratic, and that learning is culturally mediated. We understand that every person (students and instructors alike) bring unique assumptions and biases to the classroom, and that these affect learning. We can mitigate the negative impact on learning by creating inclusive classrooms, based on methods we learn in cultural competency training seminars and workshops. Happily, all classroom practices that support the retention of minority students also are practices which support all student learning and retention, and are encouraged by the National Association of Academies of Science. These practices include active learning, practice in metacognition (by both faculty and students), and by providing examples of real scientists with diverse backgrounds.

Of course, providing examples of real faculty with diverse backgrounds would go a long way towards creating an inclusive classroom. Yet we fall short in that regard. Of our 22 full time faculty, 19 are identified as white, one as Hispanic, and two as Asian. Our part time faculty reflects nearly the same relative representation. We have one African American part-time faculty member.

Many of our part time faculty come from Portland State University. At that institution, in 2010, of all part-time faculty teaching, 8.7% were minority, but only 0.04% were African American or Hispanic (most minorities were Asian). While we do not “recruit” faculty from PSU, that is the source of many of our part time instructors, since they tend to populate our job pool. Positions for full-time faculty are advertised nationally, and we value efforts to target advertising to reach African American, Hispanic, and Native American candidates. In terms of equity and inclusion, we have seen improvements during the most recent faculty block hire process.

Additionally, Biology SAC members do reflect the diversity of our student body in other ways, including:

- Prior work experience
- Educational backgrounds
- First languages spoken
- Socioeconomic backgrounds
- Service in the military
- Gender and Sexual Orientation
- First members of their families to attend college

B. Changes the SAC has made to instructor qualifications since the last review and the reason for the changes.

No changes have been made to our instructor qualifications since the last program review.

C. How have the professional development activities of the faculty contributed to the strength of the program/discipline? If such activities have resulted in instructional or curricular changes, please describe.

Our full-time and part-time faculty participate in a variety of professional development activities. These include, but are not limited to:

- **Workshops**
 - The Community College Undergraduate Research Initiative (CCURI)
 - Willamette Valley Biological Education Network Workshop
 - National Academy of Sciences workshops
 - Great Teaching Seminars
 - Teaching and Learning Center Workshops
 - Siskiyou Field Institutes
- **Conferences**
 - HiTech Conference
 - Community Colleges for International Development Conference
 - Anderson Conference
 - AAC&U (American Association of Colleges & Universities) Conferences
 - Functional Medicine conferences
 - STEM Tech
 - Vision and Change
 - NW Bio
- **Webinars, Seminars and Other**
 - Race and Inclusion seminars
 - Bio-Link
 - EXITO
 - New Faculty Institute
 - CCIE Trips
 - Sabbatical Leave

All of these activities are beneficial and often lead to curricular and/instructional changes. Below are only two of many examples of the importance of these opportunities.

- Valance Brenneis ESR/BI at Rock Creek attended a CCURI (Community College Undergraduate Research Initiative) field methods workshop in Jackson, WY in August 2015. She learned to read animal signs and tracks to set up more effective camera traps, four of which were purchased to detect wildlife in the environmental studies center on the Rock Creek campus. The cameras are used in BI 141: Habitats: Life of the Forest and ESR classes. This is a way to get students involved in research design, implementation and analysis in our biology courses. This was funded through an NSF grant to CCURI. Valance has also attended multiple content area workshops, all which were self-funded, to learn more about content essential to the courses she teaches (e.g. BI 141: Habitats: Life of the Forest and BI 143: Freshwater Biology). These included two weekend workshops at Opal Creek Ancient Forest Center, as well as a week-long workshop on wetland plants (also self-funded). She uses content from each of these workshops to help improve her instruction and to design more hands-on, inquiry based activities.
- Nora Stevens, a part time instructor who teaches at Sylvania, Southeast, and Cascade, attended the Great Teaching Seminar, where she learned many active learning ideas and techniques that added to her classes' POGIL (Process-Oriented-Guided-Inquiry-Learning). She also attended a 3-day workshop that improved her ability to facilitate POGIL in her classes. In addition, she attended an AAC&U (American Association of Colleges & Universities) Conference on General Education. She also received training in the LEAP rubric on Quantitative Literacy which has allowed her to train PCC colleagues to score using the QL rubric. Finally, she has provided gap analysis for EAC/LAC Integration Group, which is of enormous assistance to the SAC.

These opportunities are very important to instructors as evidenced by the fact that many of these were self-funded. Many part-time faculty take part in professional development opportunities even though they face more scheduling and financial burdens. Until recently, there has been very little funding to support professional developmental opportunities for part-time instructors. We support the changes in the new part-time contract, which include new funding opportunities that are now available to part-time instructors. We anticipate more involvement by our part-time faculty resulting in even more exciting instructional and curricular changes. The impact of this development is far-reaching, since a significant percentage of our Biology courses are taught by part-time faculty (Figure 2.)

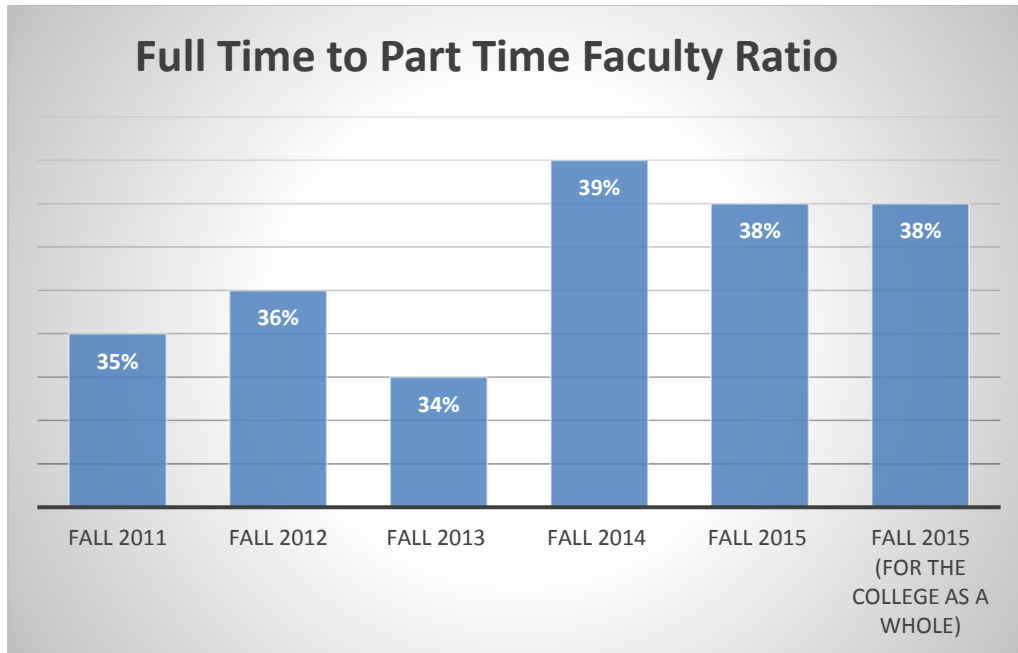


Figure 2. FT to PT Faculty ratio of the number of sections taught by full-time faculty to total sections taught.

6. Facilities and Academic Support

A. Describe how classroom space, classroom technology, laboratory space, and equipment impact student success.

There have been several changes since the last program review that have had a positive impact on student experience and success. These positive changes include:

- Laptops and computer carts have been made available for classroom and laboratory use at Cascade, Southeast and Sylvania
- The Makerspace, STEAM space and the STEM Center have been created at Sylvania, and Southeast
- Learning Gardens have been developed across the district
- Sylvania and Southeast campuses have procured clickers for classrooms
- Environmental Studies Centers have been created at Rock Creek and Sylvania

While the number of classrooms and laboratories has increased since the last bond measure, many existing and new educational spaces are not ideal. Without proper classroom and laboratory space, working and functioning technology, and modern equipment, student success is negatively impacted. Issues with educational space include:

- Lack of dedicated space for students working on independent study and research projects on all campuses.
- Lack of flexibility in seating in classrooms, preventing effective group work on all campuses.
- Lack of visibility of white boards on all campuses
- Inadequate allocation of server space for shared materials on all campuses
- Variation in configuration of media podia on all campuses
- Lack of institutional licensing for software such as Tegrity on all campuses.
- Variation in equipment availability across the district for gene technology, molecular biology, electron microscopy and digital light microscopy.
- Lack of space in labs that impact student safety and participation at Sylvania and Rock Creek
- Excessive noise from construction during peak class times at Sylvania, Rock Creek and Southeast
- Excessive noise from adjacent classrooms and laboratories at Cascade
- Excessive noise from ventilation and HVAC systems at Southeast
- Outdated rooms with inadequate ventilation at Sylvania
- Lack of access to power outlets at lab stations at Cascade
- Poor design of lab stations that interferes with group work at Cascade
- Excessively cold temperatures in laboratories at Cascade, such as in Jackson Hall 216, and excessively warm temperatures, such as in Jackson Hall 110

Resources from the most recent bond measure have been used to improve the number and quality of Biology courses across the district. This is most significant at the Southeast Campus. In the Winter of 2014, the new Student Commons Building at Southeast became operational with two fully-equipped science laboratories and preparation space (and lab tech staff) dedicated for Biology. A full inventory of equipment was purchased to support course teaching. This includes 48 compound microscopes and sets of histology slides, anatomical organ models and bones, a collection of preserved animal specimens and animal models, and a live plant collection. We have an autoclave and incubators. We are now able to offer both 100-level (BI 121 and BI 122) and 200-level (BI 231-233) Anatomy and Physiology courses, Microbiology (BI 234), and 200-level Principles of Biology (BI 211-213). As a result, we can now support students pursuing careers in the allied health field, including nursing, medicine, naturopathic medicine, dental hygiene, and PCC's EMT Paramedic AAS degree. We also support students seeking a 4-year degree in the Biological Sciences.

The biology laboratory courses at the Rock Creek campus are housed in Building 7. Four laboratory classrooms are used throughout the week for Biology labs and for some Veterinary Technology, Biology and Management of Zoo Animals, and Landscape Technology classes. Each lab classroom has a full set of compound microscopes, and some specialized equipment for targeted course needs. Other equipment and most supplies are stored in a centrally located preparation laboratory area and are assembled and provided by our technical support staff as needed for each course. Examples of shared equipment that must be transported between lab classrooms include water baths, visible light spectrophotometers (one set for shared use), stereo microscopes, micropipettes, student pH meters, molecular models, and glassware and other consumables. Numerous human and animal anatomy models and prepared microscope slides are available for student use in the spaces designated for anatomy and physiology classes and during open laboratory study times. Several types of equipment and permanent supplies (such as glassware) are kept as "shared" class sets and stored in between uses, then transported on carts as needed for a particular class activity.

As instructors respond to the recommendations of Vision and Change by developing more inquiry-based activities, including undergraduate research experiences in the courses, it is becoming clear that we need to rethink our current system of providing equipment and glassware by transporting a set amount into a classroom for a particular activity. For students to design and carry out their own unique experiments, basic equipment such as measuring devices, test tubes, racks, stir plates, vortex mixers, and spectrophotometers should be housed in the teaching laboratories rather than being transported from the preparation area on an "as needed" basis.

B. Describe how students are using the library or other outside-the-classroom information resources.

Our course reserves are among the most heavily used by students. For example, in the 2015 calendar year, there were a total of 4,308 items loaned. Students primarily use the library for materials that we have placed on reserve, including anatomical models, microscopes and slides, and textbooks.

Biology students use the library more than most other students at PCC. The Biology Research Guide is the most used Research Guide at PCC. From Fall 2010 to Spring 2015, there were 23,046 page views of the Biology Research Guide (almost double the number of the next most viewed research guide, Psychology). Among the library databases, the science and biology databases are heavily used. For example, from 2010 to 2015 the number of searches on ProQuest Biology ranged from 18,853 to 29,227 and the number of articles retrieved ranged from 12,932 to 20,828.

Many biology instructors include a library orientation, taught by a librarian, as a part of their course. These orientations are conducted in a way that allows students to use computers to search library holdings. The orientations are geared to the specific assignments associated with a particular biology course. Between 2012 and 2015, there was an average of 70 orientations per year, serving a total of 4,164 students (average 1,388 per year).

In addition to the library, our students use many outside-the-classroom information resources, many of which are relied upon to support meeting CCOG goals. For example, students might be instructed to find information about endangered species at a government database website, or might use World Health Organization data to learn about human population growth. Another example is the use of TED talks to accompany discussion about the biological meaning of the terms such as "race", or to learn about conservation and environmental problems.

Some instructors incorporate the use of textbook-publisher provided learning platforms for student assessment. This allows students to practice multiple choice questions in order to prepare for exams and improve their metacognition. They also use systems to access audio recordings of lectures, an electronic copy of their textbook, and lab websites with cadaver dissection and histology pictures.

C. Does the SAC have any insights on students' use of Advising, Counseling, Disability Services, Veterans Services, and other important supports for students? Please describe as appropriate.

Many students seem unaware of many of the services that are offered to them. Instructors make a point to inform students of the types of services and assistance available at PCC.

- **Advising**

Student use of advising varies. It has come to our attention that some students have been given incorrect and/or conflicting information when using advising services. For example, students have been advised to take BI 101 before taking BI 112 (which is

unnecessary for most) and to take BI 121 and 122 before the BI 231-233 series (those series serve different populations).

At this time, there is no one path for completion, so students taking Biology classes do not fit one advising path. Therefore, we recommended that one advisor on each campus specialize in advising Biology students.

- **Disability Services**

We have seen an increase in the number of students using Disability Services. This has presented multiple challenges, especially for accommodations during lab and lab practicals. Please see Section 4B for more details on this problem.

Strong relationships with particular DS counselors have been developed at some campuses. At the Sylvania campus, a single counselor works exclusively with the BI department. This arrangement provides a clear path of communication between faculty and counseling with regard to at-risk students. There is a move in advising and counseling to designate a liaison from each campus for a department. This may be a valuable model to explore further.

- **Veteran's Services**

Some of our students use Veteran's Services on campus. However, as with other services, many students are not aware of what is available to them.

- **Learning Resource Centers**

Learning Resource Centers are a critical system of support and are a valuable resource to our students across the district. Unfortunately, at RC and other campuses, the position of the LRC coordinator has been changed from FT faculty to AP. While our AP staff is very good at what they do, we feel that this change could have a negative impact on the services the LRC provides.

8. Recommendations

A. What is the SAC planning to do to improve teaching and learning, student success, and degree or certificate completion?

The Biology SAC currently has several projects and initiatives in place for improving teaching and learning and student success. Some of these are relatively new, and some are ongoing. Some are discrete projects that are specific to our discipline, while others are ongoing habits, actions, and a culture of practice we have adopted to support the strategic plan of the college. Such initiatives include:

- Continuing our work with Human Resources and the Office of Equity and Inclusion to ensure that all future Biology Screening Committee work is guided by principles that will improve equity and inclusion in hiring and teaching.
- Continuing in professional development by attending professional meetings at the national, regional and local levels. These include meetings of the the Human anatomy and Physiology Society, the Northwest Biology Instructors' Organization Annual Meeting, The Pacific Northwest Great Teaching Seminars and the Partnership for Undergraduate Leadership in Science Education.. Members of the SAC also regularly engage in opportunities for professional development at PCC. These include TLC workshops and seminars such as The Anderson Conference, equity and inclusion discussions, and active learning seminars.
- Implementing several new tools developed by Biology SAC faculty members, designed to increase student success in BI 112, which is a large-enrollment “gateway” course for students planning a career in allied health professions. These tools include a study skills seminar, a preparation video, and a peer mentoring methodology.
- Continuing to evolve our pedagogy. We continue to update our courses to more directly align teaching and learning outcomes with the recommendations of Vision and Change. As we adopt changes, we are mindful to maintain rigorous, high quality instruction, and consistency in instruction and assessment. We also continue to collaborate with each other to employ innovative teaching and learning techniques with the goal of supporting student success. Examples of these methods include: POGIL, classroom clickers (for immediate assessment), case studies, community-based learning, and course undergraduate research.
- To improve learning in a laboratory setting, we are updating and modernizing lab exercises in several courses. We are replacing standard lab activities with those that promote inquiry-based learning. We are also increasing the number of open labs offered to BI 231-233 and BI 112 students throughout each term. We need robust ways to connect curricular innovation and logistical support. For example, at Sylvania we are currently piloting an A&P laboratory coordinator model. The faculty laboratory coordinator mentors part-time faculty and coordinates with instructional support staff and faculty to maintain consistency and allow innovation.

Recommendations

- To improve rates of degree completion, we are expanding distribution of the Biology Major Planning Chart developed by Jaimie Powell. Every student enrolled in Principles of Biology will receive this chart at least once per term. We are also maintaining and promoting collaborations with other institutions (PSU, U of P, OSU, U of O, and OHSU) to improve the transfer experience for students. We are also continuing the work we've begun with the Office of Academic Affairs and existing PCC committees to explore methods to promote smoother transfer pathways for our students who are working toward B.S. degrees in Biology. Subject Majors, guided pathways, and ASOT in Biology are all possibilities being considered at this time; our SAC is committed to participating in this discussion. The SAC also participates in regional and national programs promoting degree completion, including BUILD EXITO and CCURI.

B. What support do you need from the administration in order to carry out your planned improvements?

1. **Support for IST staff.** Instructional support staff are a key component in the delivery of high quality education in a discipline where there is an increased focus on critical thinking through inquiry based learning and research. Support of quality education involves a high level of responsibility and a depth of professional knowledge. Therefore, we request
 - a. Review of the organizational structure of instructional support (e.g lab techs). We would like to suggest the possibility of having an Academic Professional managing laboratory operations on each campus.
 - b. Funding for lab support positions that are currently half-time
 - c. Funding for the backfill required to allow qualified tech staff to teach
 - d. Release time to support the laboratory coordinator model
 - e. Additional funding to support technical training and other forms of professional development for laboratory tech staff
 - f. Funding for the backfill required to allow lab tech staff from all campuses to get together and have once a term meetings to share ideas and strategies to optimize resources.

The SAC acknowledges that not every campus program is the same size and that good support may look different at different campuses.

2. Support for infrastructure upgrades

- a. Allocation of space and funding to equip dedicated research areas where faculty could develop new materials and students could continue research begun during instructional time.
- b. Funding to upgrade existing office spaces or allocate new spaces to maximize productivity, comply with FERPA regulations and support faculty with multi-year contracts.
- c. Funding to upgrade existing lab spaces for safety and curricular needs. Needs are campus specific (see Tables 1-4 in Appendix) (Fig. 1)

Recommendations

- d. Funding to upgrade existing equipment. Needs are campus specific (see Tables A-1, A-2, A-3 and A-4 in Appendix)
- 3. Support for the increasing demands on the SAC chair**
 - a. Funding for release time in concert with a SAC wide discussion of the efficacy of our current model (i.e. how to more effectively share the workload).
 - 4. Support for faculty**
 - a. Consideration of the need for additional full-time faculty
 - b. Continued support for part-time faculty with the recognition of how big a step forward has been made with the large investment in professional development funds being made available to part time faculty and the appreciation of the number of multi-year contracts biology was able to fill for the upcoming academic year. There is a need to train all faculty on laboratory specific equipment as upgrades are made and to ensure safety. Funds for part time faculty participation are requested.
 - c. Enhancement of OSHA training. All faculty teaching laboratory classes are required to have 4 hours of OSHA training each year. Part -time attendance is currently paid. However, more hands-on training specific to teaching situations would help make better use of the existing funds. Chemistry is working with Risk and Safety this year to provide enhanced training opportunity, many of lab safety issues are similar so we think it would be possible to leverage existing work done to make this opportunity available for biology.



Figure 3. The laboratory prep area at Sylvania Campus.

Appendix**Campus Specific Needs and Requests****Cascade**

The Cascade Campus has limited office space. Most of the part-time faculty have dedicated space for them to work or store materials. Rock Creek and Southeast have dedicated spaces for part-time faculty can work comfortably and to store personal belongings.

We would like increased support for technology at classroom podiums. We need updated software and settings that will allow us to deliver our classes in a timely and effective manner. Our programs do not load quickly and our settings are limiting our use of software. Specifically, an institutional license for Tegrity and the ability to use 'presenter mode' in power point projections would be immensely beneficial.

Table A-1. Specific requests requiring funding for Cascade Campus.

Course/Facility	Need	Strategic plan
Office space	Multi-Year Contracts	
All classes	Presenter mode in lecture and lab rooms	Outstanding Education
202, 141, 101-103, 212-213	More native plants in landscaping	Outstanding Education
BI 101-103	Funding for a lead person in BI 101-103	Outstanding Education
Anatomy and physiology	Cadaver tables. New equipment for physiology experiments	Outstanding Education / Innovation
234, 112	Microcentrifuge	Outstanding Education / Innovation
160, 161, 200, 143, 141	Vans for field trips	Drive student success

Rock Creek

The Biology Dept. on the Rock Creek Campus has several unique needs to unlock our full potential for providing a quality innovative environment to fuel student success. Our top priority involves a new set of microscopes for one of our Bi 231/232/233 A&P labs. Our current scopes in this lab are not performing well and are difficult to use. There are quality issues with the ocular lenses and the internal gearing. The faculty recommend that these scopes be replaced with a new set

of 24 microscopes. Our second need is to find space for undergraduate research that is on-going and expanding. We recently sent five students from Rock Creek to the Community College Undergraduate Research Initiative conference in Nashville, TN presenting research they did in their classes at Rock Creek and are continuing to infuse research into our curriculum, especially in Bi 211, 212 and 213 and in Bi 141, 142 and 143. We could free up the spaces between the labs for undergraduate research by purchasing a set of laptop computers in a rolling cart that could also serve to recharge them. These computers would replace the desktop computers that currently occupy these spaces.

Table A-2. Specific requests requiring funding for Rock Creek Campus.

Course	Need	Strategic plan
BI 231-233	New microscopes	Outstanding Education
BI 211-213	Laptops to replace desktop computers to free up space for research	Outstanding Education Innovation
BI 112, BI 121-122, BI 231-233	The half time lab support position for A&P to be upgraded to a full time position	Outstanding Education Innovation
All Classes	3D printer to support student learning	Outstanding Education
	New slides and preserved specimens	Drive student success
	Electron microscope	Outstanding Education Innovation
	Technology and software to be upgraded for ease of use	

Southeast

Students and faculty at SE Campus have greatly benefited from the brand new, fully-equipped laboratories dedicated to Biology courses in the Student Commons Building. Now we need to invest in training for the use and maintenance of the many monitors, sensors, and tools of biotechnology that are part of our new laboratory collection. Currently we own several tools (such as an EKG machine) but adjunct faculty report they do not use them due to a lack of training. Both faculty and laboratory technicians need this training.

Table A-3. Specific requests requiring funding for Southeast Campus.

Course	Need	Strategic plan
BI 112	Individual gel electrophoresis and more micropipettes	Outstanding Education
BI 121-122, BI 231-233	Histology slides from OHSU	Outstanding Education
BI 211-213	Supervised lab space for student projects	Outstanding Education Innovation
BI 211-213	Support for lab techs so they know how to support open ended projects	Outstanding Education Innovation
All Classes	Professional development and equipment use in the lab	Outstanding Education Innovation

Sylvania

Faculty at Sylvania have benefitted from the support provided at the campus and district level for professional development and have utilized that support to develop curriculum. We hope that support for professional development continues and applaud the increase in availability of funds to support Part-Time faculty. While there are still equipment requests our greatest needs are based on building infrastructure and instructional support. We are currently housed in a building that is in need of renovation. We experience electrical, HVAC, computer and safety issues on a regular basis. We are hopeful that many of these problems will eventually be solved with the bond remodel. The relatively recent allocation of space in HT 207 for Part- Time faculty with the recent upgrades for safety (blinds) has been appreciated. However we recognize the need for upgrades in our main space (HT 305) that currently houses 8 full time faculty, 4 PT faculty and an administrative assistant in cubes in an open space. The space is often noisy, limiting productivity, as well as making it impossible to maintain student confidentiality. We hope that this will also be remedied in the upcoming bond remodel. Therefore, if the bond remodel becomes a reality, then our greatest need will be for adequate training and expertise to support instruction. The current lab coordinator role (filled by Marilyn Thomas, co-chair) bridges the gap in Anatomy and Physiology but we are concerned about losing the release time she gets from being dept. chair that allows her to fill that role. The changing technological needs are not currently met for Biology classes. This has led to inefficient use of resources and has negatively impacted our ability to deliver an outstanding educational experience. Training to enhance tech support might include:

- 1) Having a formal arrangement for the science lab techs across the district to meet and tour our respective lab facilities and discuss lab-related issues and changes, akin to the SAC meetings.

2) Identifying areas of challenge or particular opportunity and reserving funds and time to support professional development for lab tech staff.

Table A-4. Specific requests requiring funding for Sylvania Campus.

Course	Need	Strategic Plan
200 level A&P	Formal release for faculty lab coordinator	Outstanding Education
All Lab Classes	Training to enhance tech support	Outstanding Education
All Lab Classes	Support for district lab tech	Outstanding Education
	meetings	
All classes	Infrastructure upgrades	Outstanding Education
All classes	Office space upgrades to support FERPA compliance and productivity	Outstanding Education
All esp. 234 and BI 200s	New scopes and lab equipment so it is current	Outstanding Education Drive student success
All Classes	Digital microscope	Student Success Innovation
14, 145, 161, 160, 200A, 202 all field trips	Enough equipment so classes are adequately supplied. Dedicated field equipment	Outstanding Education Achieve sustainable excellence in all operations
All classes	Continued support for professional development	Outstanding Education

Research References

Graham, Frederick, Byars-Winston, Hunter, & Handelsman (2013). Increasing persistence of college students in STEM. *Science*, 341, 1455-1456.

Handelsmann, J., D. Ebert-May, R. Beichner, P. Bruns, A. Change, R. DeHaan, J. Gentile, S. Lauffer, J. Stewart, S. M. Tilghman, and W. B. Wood. 2004. Scientific teaching. *Science* 304: 521-522.

Henderson, C.; Beach, A.; Finelstein, N. Facilitating change in undergraduate STEM instructional practices: An analytic review of the literature *J Res Sci Teach* 2011, 48, 952–984.

Junge, B, Quinones, C, Kakietek, J, Teodorescu D, Marsteller P. 2010. Promoting undergraduate interest, preparedness, and professional pursuit in the sciences: an outcomes evaluation of the SURE program at Emory University. *CBE-Life Sciences Education* 9: 119-132.

Osborn, JM and Karukstis, KK. 2009. The Benefits of Undergraduate Research, Scholarship, and Creative Activity. pp. 41-53 in *Broadening Participation in Undergraduate Research: Fostering Excellence and Enhancing the Impact* (Boyd, MK and Wesemann, JL, eds.) Council on Undergraduate Research, Washington, DC.

Shaw, K, Holbrook, A, and Bourke S. 2013. Student experience of final-year undergraduate research projects: an exploration of 'research preparedness'. *Studies in Higher Education* 38:5, 711-727.

Jackson, D., Starobin, S., & Laanan, F. (2013). The Shared Experiences: Facilitating Successful Transfer of Women and Underrepresented Minorities in STEM Fields. *New Directions for Higher Education*, 162, 69-72.

Reyes, M. (2011). Unique Challenges for Women of Color in STEM Transferring from Community Colleges to Universities. *Harvard Educational Review*, 81(2), 241-262.

Faculty Presentations at Regional or National Meetings

Jan Just. Developing Effective Active Learning In-Class Content for Front-Loaded Biology Courses. NorthWest Biology Meeting. Eugene, OR. 2016

Linda Fergusson-Kolmes. Plastics in the Ocean: Engaging Students in Core Competencies through issues-based Activities in the Science Classroom. Ocean Sciences Meeting, New Orleans, LA. 2016

Josephine Pino. Biology lab classics gain new life through case study lens. League of Innovations in Community College. STEM Tech Conference. Scottsdale, AZ. 2015

Dieterich Steinmetz, Nora Stevens, Josephine Pino, Alexie McNerthney, April Ann Fong, and Linda Fergusson-Kolmes. Creating a Shared Vision Portland Community College, Sylvania, Rock Creek, Cascade, and Southeast Campuses. North West Biology Meeting. Vancouver, BC. 2015

Biology SAC Outreach

The following list is not comprehensive; it is meant to be a snapshot to represent evidence of our commitment across all campuses to a broad range of classes to high impact practices.

High School Outreach

Natalie Wang, 8th grade student from ACCESS Academy, won Best of Category in Microbiology for Middle Schools at the 2016 Intel Northwest Science Expo. Natalie was also nominated to Broadcom MASTERS, the national science fair. (Troy Jesse, Cascade Faculty Supervisor)

Community-Based Learning and Research

Approximately 90 Biology 213 students contributed to a site-specific study of differences in invertebrate abundance on native vs. non-native vegetation in Mt. Tabor Park

BI 213 Poster Presentations

The Biology 213 Biology posters were presented on the Southeast Campus in the Student Commons Building. The poster presentations were open to students, staff and public in June of 2015.

- The Effects of Soil pH on the Weight and Height of *Tagetes*
- Effects of Sucrose on *Tagetes* growth
- The Influence of Mycorrhizal Associations on the Growth of Legumes
- The Effects of Auxin on the Growth of Corn (*Zea mays*) Seedlings

PCC Habitat

The PCC Habitat Team at Sylvania continues to provide leadership opportunities for students each term.

Field Classes/Undergraduate Research

Examples of studies developed by students at SY and carried out in a week long field experience in BI 200B

- Asynchronous Eye movement in the Western Fence Lizard related to dominance and predator avoidance.
- The effect of flood/drain agricultural practices on water quality in the Klamath Basin
- Territoriality and mate tracking behavior in the northern scorpion (*Paruroctonus boreus*).
- Succession of plant life on lava flows on the Medicine Lake Volcano.
- The effect of roads on abundance and diversity of invasive plant species in the Great Basin.
- The effect of the encroachment of western juniper (*Juniperus occidentalis*) on the abundance and diversity of native plant species.

Appendix

- The effect of the encroachment of western juniper (*Juniperus occidentalis*) on the abundance and diversity of native Lepidopteran pollinators.
- The effect of the encroachment of western juniper (*Juniperus occidentalis*) on the abundance and diversity of native on soil quality.
- Thermoregulation and activity levels in the gopher snake (*Pituophis catenifer*).
- Aquatic invertebrate species and abundance in three lakes with variable levels of human disturbance for agriculture.
- Inter- and intra-specific territoriality and dominance behaviors in the desert collared lizard (*Crotophytus bicinctores*).
- Diurnal activity levels in the long-nosed leopard lizard (*Gambelia wislizenii*) related to temperature.
- Plant species diversity and abundance based on aspect and soil moisture content on a cinder cone in the medicine lake volcano system.
- Bacterial diversity in a variety of hot springs in the great basin near the Alvord desert.

Major's Biology progressive research projects (BI 211-212-213) do a project each term, beginning with a photosynthesis or enzyme project with a limited opportunity to customize to BI 213 where the emphasis is on research design and development of a project from the ground up. Examples of these projects:

- Martin, A. 2016. Absorption spectra of New leaf Growth and Old leaf growth of a Rose Plant (*Rosa spp.*)
- Cooksey, J. 2016 Effects of Light Exposure on Pigment Concentrations in Rhododendron (*Rhododendron ferrugineum*) Leaves
- Goebel, A. Photosynthetic Pigment Variation in Marine Green Algae (*Ulva sp.*) and Brown Algae (*Fucus spp.*)

Student Research Presented at National Meetings

CCURI Conference Poster Sessions

Spring 2016 Colloquium held at Volunteer State College in Nashville, Tennessee

Six students attended with adjunct Rock Creek faculty member Ksenia Everton. All research presented at this conference was conducted as part of Principles of Biology courses.

- Justin Amesbury: "Antibacterial effect of sodium bicarbonate on the growth of *Escherichia coli*"
- Leslie Vallela and Austin Waibel: "A comparison of enzymatic activity of amylase from *A. oryzae* and *B. subtilis* as a disinfectant additive"
- Joseph Kincaid and Cali Clements: "Efficacy of garlic juice in the inhibition of *Bacillus subtilis*"
- Brian Heck: "Photon Reactivity of Essential and Accessory Pigments in *Mahonia aquifolium*"

Colloquium held at Portland Community College, Rock Creek Campus, Spring 2015

Many PCC faculty and students attended:

- Student: Paige Glydersleve; Faculty Advisors: Josephine Pino, Jonathan Wherry; Poster Title: A Statistical Analysis of Women in STEM Courses at Portland Community College
- Students: Fangzhou Luo, Nicholas Wagner, Faculty Advisors: Josephine Pino, Lisa Brown-Istvan, Jen Peters; Poster Title: Morphological and Genetic Identification of Two Moss Species *Dendrocalisa abietina* and *Orthotrichum yell II*
- Student: Michael Belcher; Faculty Advisor: Josephine Pino; Poster Title: The Exploration of Plant Regeneration Using Protoplasts Derived from the Tissue of Local Moss Species

National Poster Conference, held in Washington, D.C., Fall 2014

The Conference included visits to every Oregon Congressional representative's office. Nicole Petegorsky and Josephine Pino attended.

- Students: Nicole Petegorsky, Paige Gyldersleve; Faculty Advisor: Josephine Pino; Poster Title: DNA Barcoding Identification of *Coleoptera* Species in a Portland, Oregon Mixed Douglas-Fir Forest

Winter 2014 Colloquium held in Mesa, AZ

Attendees were all student poster authors and faculty member, Jaimie Powell

- Students: Amy Balint, Laura Kentnesse, Nicole Petegorsky; Poster Title: Effects of Collection, Preservation, and Sample Preparation Methods on the Quality of Extracted *Coleoptera* Genomic DNA for use in DNA Barcoding

Poster Conference Spring 2013

Kevin Lien and student Amy Balint attended.

- Student: Amy Balint; Faculty Advisors: Kevin Lien and Tom Robertson; Poster Title: Bronson Creek: A Baseline Assessment of the Biotic Integrity of an Urban Stream in Washington County, Oregon.

Student Amy Balint was later accepted to the prestigious Harvard Forest Summer Program.

Sample Library Assignment

5 points. Due date: _____ Name: _____

1. CHOOSING AND EXPLORING YOUR TOPIC

Encyclopedias give valuable background information when you start researching a topic. Wikipedia is one that is sometimes, but not always, reliable. The library encyclopedias aren't as big, but are more consistently reliable.

You will have a project this term to learn more about an environmental issue or problem. If you can't think of one, browse a web site like the Oregon Public Broadcasting ECOTROPE blog: <http://www.opb.org/news/blog/ecotrope/topic/fish-and-wildlife/>.

Write the environmental problem in the form of a question. Underline the most important words describing your topic (usually *nouns*); these are the keywords you'll use as you begin your research. *Examples:* "Is geothermal a viable alternative source of energy?" "Should oil and gas companies be allowed to continue hydraulic fracturing, aka fracking?"

2. Go to PCC Library home page: www.pcc.edu/library. Click on the **Research** tab in the library home page. Click on "**Finding**", and in the page that follows, under "**Books, Videos, and More**" select **Online Encyclopedias**. Search on Gale Virtual Reference Library using one or several keywords you underlined in question #1.

Write down one fact you learned from the encyclopedia database about the environmental problem you are researching.

2.1 Visit the page <http://www.pcc.edu/library/research/find/peer-reviewed-articles/> to learn what a peer-reviewed article is.

FINDING SCIENTIFIC ARTICLES

*PCC Library subscribes to about 800 printed magazines and journals (periodicals). In addition, it gets online versions of about 80,000, packaged in databases! The article databases are listed on the Databases A-Z page (on the library home page), but in order to choose a database, use a **Research Guide** (also linked from the library home page)*

Go back to the Library Home page (click on the **Home tab**). Find the Students box, and in it click on the **Research Guides**. Click on the **Science** button, and on the expanded list find the guide of Biology, choose one of the databases listed to find a scientific research article. Which database did you chose?

Academic Search Premier JStor ScienceDirect Other: _____

3. **Search** that database with your keywords. Read the titles and abstracts on the first 1-2 pages of search results. Based on reading the titles and abstracts, **select one article** that has research-based information on your topic.

Title of article:

Title of publication:

Author(s):

3.a Download or view the PDF file of the article and PRINT the first page of the article you selected and attach it to this assignment

4. Search next to the list of articles or in the page presenting the article any button or box labeled ‘**Cite this item**’ or ‘**Export**’, or other word to see if this database provides a formatted citation? Y / N

Can you limit your search to Peer Reviewed articles? Y / N

5. While the in the **Biology Research Guide** click on the **Google Scholar** link. Because most scientific articles are contained in expensive journals it is usually difficult to find good research articles with a regular web search. Google Scholar provides a way to find high-quality research articles through a web search. **Use Google Scholar** (<http://scholar.google.com>) to locate an article on your topic:

If you are off campus -- before you search Google Scholar, set your preferences to bring up links to full text articles available to PCC students. Here's how: <http://www.pcc.edu/library/research/find/google-scholar/>

Title of article:

Title of publication or publishing web site:

Author(s):

What kind of publication is it (e.g. magazine, peer-reviewed journal, book, and website):

Briefly describe why you think this is, or isn't, a credible article about your topic. Does that article provide data to support the information provided, or claims made, by the author?

6. From the presentation given, list 2 characteristics of a peer-reviewed article.

Do you think the article you found using Google Scholar went through a peer-review review process?

Go to the Library home page and click on the box labeled **Library “How Do I...?”** In the following page select ANY ONE of the buttons and list the steps (Buttons to click) you followed to get an answer. What is the answer you found?

7. On the search box in the library banner, search for ‘Summit’. What is **Summit** and how can you request that materials be sent to you from another college? (hint: look in *Library A-Z*)

CITING YOUR SOURCES

Providing proper documentation of your sources is an important part of research and writing. You'll find help on the library web site.

8. Write down TWO reasons you should cite your sources: