Program Description and Scope:

1. Program Review Title: Biology
2. Academic year: 2013/2014
3. Review Type: Instructional Disciplines
4. Program/Departments: Biology (04000)
5. Authority Code: 44-Science, Engineering, and Mathematics
6. External Regulations: Yes  No X
7. Provide a brief narrative that describes the instructional program/discipline.

The Biology Program is designed to promote student success in subsequent educational programs they wish to enter and to instill in students an interest in biology. Some students within our program intend to transfer to a four year degree programs in biology, while other students have a goal to complete a vocational health sciences program, such as nursing, dental hygiene, physical or respiratory therapy programs, pharmacy or physician assistant programs. Finally, some students in our program are taking our courses as a general education requirement. The Biology Transfer Program offers a regimen of science courses equivalent in content and quality to the core freshman or sophomore science courses for biology majors at four year institutions. The Allied Health sciences students are completing prerequisite courses required to apply to health science programs. Although the majority of students in the program are intending to pursue a career in biology or health sciences, we also offer courses that fulfill general education requirements and/or personal interest.

8. Describe how the program specifically serves students, faculty and staff.

We provide a variety of pathways fashioned to meet a range of career goals. Our program offers sequences of courses for students that are intending to transfer to a four year biology degree program that fulfill lower division requirements for most biology programs at UC and CSU. Student completing the proper sequence may obtain an Associate of Sciences degree in Biology. An Allied Health Sciences certificate may be earned by students applying for vocational health sciences programs such as nursing, physical therapy, physician assistant and dental hygiene.

9. Describe how the program addresses current needs and applies current
All current biological and medical fields are strongly technology dependent, utilizing state of the art instrumentation and approaches. Our program employs modern instrumentation and emphasizes scientific approaches to knowledge acquisition and analysis.

10. Discuss the impact of the program on the college and/or other programs.

The quality of the pre-requisite courses needed by students as they enter health sciences professional programs or transfer programs at other institutions is a strong predictor of their success within these professional programs. Student success requires high quality pre-requisite courses that give the student an adequate foundation in both practical and theoretical aspects of biology.

11. Discuss the impact of the program on the community and the impact of the community on the program.

A shortage of health science professionals presently exists locally and nationwide. Nurses in particular are in short supply as many of the present nurses are approaching retirement while the baby boom generation is reaching the age where health needs are increasing. In addition, many of the students in the transfer biology degree program are intending on studying medicine or engaging in biological research. These are growth industries in the Bay area. For our general education students our courses provide a basic understanding of biology and human health critical for informed decision making in later life.

- **College Mission**
  1. **Mission Statement**

     The mission of Ohlone College is to serve the community by offering instruction for basic skills, career entry, university transfer, economic development, and personal enrichment for all who can benefit from our instruction in an environment where student learning success is highly valued, supported and continually assessed.

  2. **Vision Statement**

     Ohlone College will be known throughout California for our inclusiveness, innovation and superior rates of student success.
3. *Core Values, Goals & Objectives:*

**College Core Values**
- We provide life-long learning opportunities for students, college personnel and the community.
- We open access to higher education and actively reach out to under-served populations.
- We promote diversity and inclusiveness.
- We maintain high standards in our constant pursuit of excellence.
- We value trust, respect and integrity.
- We promote team work and open communication.
- We practice innovation and actively encourage risk-taking and entrepreneurship.
- We demonstrate stewardship for our human, financial, physical and environmental resources.

**College Goals/Objectives**

1. **Through innovative programs and services, improve student learning and achievement.**

1. By 2013, have in place an ongoing system for identifying and assessing student learning outcomes at the program and course levels, which includes faculty dialogue and appropriate improvement plans.

9. By 2011, achieve 100% completion of professional development in online instructional methods and online course management for faculty who teach fully online or hybrid courses.

4. *Briefly describe how the program supports the college mission, vision selected college values.*

The Biological Sciences program addresses two key parts of the college mission: successful transfer of students to four year institutions and entry into health science professional programs. Additionally our program offers a number of general education classes that meet the mission of personal enrichment. Additionally the program is designed to support a diverse group of students in meeting high academic and professional standards through a setting where...
innovative thinking is rewarded. This is accomplished by traditional instruction, group and individual projects and hands on laboratories.

5. *Briefly describe how the program supports selected college goals.*

Students are challenged within our program with critical thinking essay and problem-based examinations, they work in groups on case studies. In laboratories students use the scientific method to gather and analyze biological data and draw appropriate scientific conclusions. Students work in groups to design presentations that review key concepts for the entire class.

6. *Briefly describe how the program supports selected college objectives.*

Students who have completed our program are well prepared for transfer at the junior level in a biology major or entry into health science programs (nursing, physical therapy, pharmacy and respiratory therapy).

- **Program SLOs & Assessment**
  1. **Program SLO -**

    **Critical thinking skills:** Students will demonstrate critical understanding of biological concepts, methods, and applications by applying critical thinking to a variety of biological situations.

    ![Indicate program assessment strategies used.](image)
    **Culminating project**
    **Performance Assessment**

    ![Describe the criteria and standards used to appraise student work.](image)

    Fall 2012: In laboratory portions of the courses students are required to analyze data collected and draw conclusions from that data. Data is maintained in a laboratory notebook in several classes or turned in as laboratory reports in other classes. These reports and notebooks require students to critically analyze and interpret data and grades are awarded according to a rubric based on these skills. One course has a culminating...
project that requires students to work independently to apply the skills and knowledge learned during the semester to isolate and identify two unknown organisms. A detailed rubric is used to determine if students were successful in utilizing past knowledge and clear logical thinking to prove the identity of their unknowns.

In lecture exams in several courses student are required to write short answer and/or essay questions that require critical thinking skills. The majority of these questions demand students integrate information from separate sources and analyze how that information relates to a key biological concept. Compare and contrast formatted questions are frequently used to encourage this type of integrative thinking.

One course has a capstone project of a medical case study. The case study requires students to garner information from the entire year long sequence of the class to answer four or five short answers. Analysis of normal physiological principles applied to a pathological situation is used to evaluate the student's success on this project.

One course has a capstone project of critically reading a review article from scientific literature and summarizing the key conclusions drawn by the research that led to that paper and how the scientific method was used to test a hypothesis, design appropriate experiments and controls and analyze data to draw the conclusions summarized.

Enter assessment results and analyze student success in achieving this program SLO.

Fall 2012: A rubric is under development to analyze how students progress through the semester or in some cases over several course sequences in their ability to do integrative thinking. This rubric will gather information on the percentages of students who successfully answer exam questions couched in a compare and contrast or other critical-thinking format. Preliminary testing of this has found only 10% of students answer compare and contrast questions in an integrative manner. The remaining students typically define key words in the
question without addressing either similarities or differences in the concepts those key words are addressing.

Fall 2013 Analysis was done to follow up on how students who had successfully completed the course whose analysis is shown in the previous paragraph (from Fall 2012) handled compare and contrast questions in the first exam of the fall semester. A similar rubric was used in this analysis and 69%-91% of the student answered this style of question by integrating information from diverse sources and critically analyzing that information.

In one course (Biology 101A-Fall 2012) assessing critical thinking skills as revealed by responses to exam questions, 57% of responses to critical thinking questions on exams earned between 80-100% of points scored for these questions; 16.3% of responses earned between 60-79%; and 26.7% of the responses scored below 59% point value. Results for the Fall 2013 assessment were 27.5% scoring between 100-80%, 30% with a score between 70-60%, and 42.5% of responses were below 59%. This represents a shift toward the middle tier (70-60%) at the expense of the highest tier. Very likely this is normal fluctuation between cohorts of small sample size (this assessment N=40). Trends will be monitored with future assessments of this SLO.

Spring 2013 (BIOL106/Finney): This course has a final project that requires students to use the knowledge and laboratory skills that they have accumulated throughout the semester in order to identify two unknown organisms. Students must be able to think critically and draw logical conclusions about laboratory results in order to correctly identify both organisms. During the Spring semester of 2013: 84% of students correctly identified both organisms, 11% of students identified only one of the two organisms correctly, and 5% of students could not identify either organism at the conclusion of the project.

Fall 2013 (BIOL106/Finney): In order to try to help students understand the type of critical thinking skills that are necessary to successfully complete their final cumulative project in this lab I am going to develop some worksheets that students can voluntarily complete. The goal is that these worksheets will help them identify common errors in their logic
when trying to identify their two unknowns.

Describe revisions in curriculum or teaching strategies implemented to promote student success.

Fall 2012: I have also posted examples of successful compare and contrast types of answers on Blackboard and increased the number of times in class I format the lecture in that context.

Next semester to address this issue I will consider notifying the students that I will not take points off answers that lack this integration on the first midterm, subtract 20% of the points on the second midterm and 30% on the third. This is under discussion with other faculty in this area.

Fall 2013: After further consideration and discussions with other faculty I decided to not implement the policy outlined in the previous paragraph in the first semester of the two semester sequence. But after seeing how successfully students did in the second semester of the sequence I did subtract credit from those student that did not compare and contrast and show critical thinking in that course.

Future Action (Improvements)

Program SLO -

Students will demonstrate the correct operating procedures in the use of lab equipment typical in the biological sciences (for example, compound microscopes, spectrophotometer, pH meter, electrophoresis gel apparatus, micropipettes, and centrifuges)

Indicate program assessment strategies used.

Rubrics
Skills Assessment

Describe the criteria and standards used to appraise student work.

Spring 2011 - Fall 2012 (present) A rubric is used ranking students as follows:
4. Student can correctly use instrument, completing all of the required steps in its use in the proper order.

3. Student performs most of the steps in the proper order, but omits one or two minor, non-critical steps.

2. Student omits many steps, including critical ones, or performs them out of order.

1. Student cannot operate instrument.

Enter assessment results and analyze student success in achieving this program SLO.

At the start of the fall 2011-2012 students in BIO 106 (Microbiology) earned an average of 3/5 and at the end the scores rose to 4/5 in 5 point rubric. This 5 point rubric would translate into 40% of the students entering microbiology at level 3 in the assessment rubric (Student performs most of the steps in the proper order, but omits one or two minor, non-critical steps) and at the end of the course 80% of the students were at level 4 (Student can correctly use instrument, completing all the required steps). Since microbiology has the pre-requisite of Biology 130, we need to measure the expertise gained by students within this course (BIO 130) to fully evaluate the rubric used in microbiology.

For three years (2008-2011) Biol 101 has been asking students to set critical illumination on a light microscope was embedded in lab practical exams, once in the 1st semester (Biol. 101A) then again in the second semester (Biol 101B). In the first semester, 51% performed the procedure correctly; 17.6% knew the procedure, but unsatisfactorily executed it; 31.4% didn't know the procedure. When retested in the second semester, 60% performed the procedure correctly; 18.5% performed unsatisfactorily; and 21.5% didn't know the procedure. This shows about a 9% improvement from one semester to the next in the number of students able to set critical illumination on the microscope correctly. During the 2011-2012 academic year, stronger emphasis was
placed on setting critical illumination during lab periods with frequent check on student microscopes during lab sessions. Retesting during this period resulted in 77.4% performing the procedure correctly; 16.4% knowing the procedure but applying it incorrectly; and only 6.2% not knowing the procedure. There was no difference between Fall semester and Spring semester results, indicating that knowledge of the procedure was retained into the second semester of the class. These results represent a considerable improvement in student performance. Results of testing during the Fall 2013 semester were basically unchanged from the previous year with 75% performing the procedure correctly, 18% knowing the procedure but executing it incorrectly, and 7% not knowing the procedure.

Students were evaluated by challenging them to properly use a compound microscope using a practical examination method. In all courses instructors judged the success of students accomplishing this SLO by individually assessing a variety of their microscope skills at the start of the semester versus at the end of the semester. An average of approximately 15% improvements was observed over course of the semester.

Fall 2013: Students were casually assessed the first week of classes on their ability to properly set up the light microscope when viewing prepared slides. As the instructors individually helped students with viewing slides they first checked individual microscopes to see if critical illumination was properly set up. During the first week of classes only 24% of the students showed they could properly set up a microscope. This suggested that they did not retain that information from the pre-requisite class (BIOL 130). As each student was individually aided in using the microscope they were told this skill would appear on the practical exam. A practical exam question similar to the one asked in 101A was designed.

Describe revisions in curriculum or teaching strategies implemented to promote student success.

Biology faculty worked together to develop standard operating procedures for setting up, using, and putting away the microscope, During 2011-2012, we averaged results from a common protocol for use of microscopes in BIOL 101A and B and BIOL
106. Upon faculty review of the common assessment protocol, we decided that each faculty can use separate assessment protocols to fit with their specific course.

This improvement was implemented Spring 2012 and continued and assessed in Fall 2013 and now faculty individually re-enforcing proper microscope practices on a individual student level throughout the semester. In future semesters we will see if this improves the percentage of students successfully accomplishing this SLO.

Future Action (Improvements)

Program SLO -

Students will demonstrate safe handling of biohazardous materials used and generated in bioscience laboratories.

Indicate program assessment strategies used.

Skills Assessment

Describe the criteria and standards used to appraise student work.

Enter assessment results and analyze student success in achieving this program SLO.

Describe revisions in curriculum or teaching strategies implemented to promote student success.

Future Action (Improvements)

SLO Matrix

Key: I-Introduced, P-Practiced with Feedback, M-Demonstrated at the Mastery Level

<table>
<thead>
<tr>
<th>Course</th>
<th>SLO-1</th>
<th>SLO-2</th>
<th>SLO-3</th>
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<tbody>
<tr>
<td>BIOL 101A</td>
<td>M</td>
<td>P</td>
<td>P</td>
</tr>
<tr>
<td>BIOL 101B</td>
<td>M</td>
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<tr>
<td>BIOL 103A</td>
<td>M</td>
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<tr>
<td>BIOL 130</td>
<td>I</td>
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</tbody>
</table>
SLO Matrix Comments

Reviewed all BIOL courses in college catalog.

BIOL 105, Heredity, Evolution and Society: Will check with full-time faculty teaching the course on current status of assessment of SLOs. Now part of the Environmental studies program. Will be in that review

and BIOL 109, Sexual Reproduction: Course is taught by Adjunct Faculty; will discuss SLOA with dean.

BIOL 140, Sierra Nevada: Consider deactivation since this has not been taught for many years. Now part of the Environmental studies program. Will be in that review

BIOL 108, Human Ecology, BIOL 141, Marine Biology, and BIOL 142, Environmental Biology, are now included in the Environmental Studies program. Now part of the Environmental studies program. Will be in that review

Student Achievement: A series of measures including course completion, course retention, persistence, program completion, and others.

List expected student achievement outcomes:

Analyze changes in data, identify trends, and provide possible contextual explanations for each measure used. (Example measures include: course completion, course retention, persistence, program completion).

Spring 2012: Data from Mike Bowman's report on Instructional Summary Data by Department shows that total enrollment is approximately the same as in 2004. This represents a drop from 2006 of about 60 students per year. This likely represents a cut of the number of sections offered due to budget constraints since demand for enrollment remains high.

According to the same source there has been a significant increase in retention from 2004 to 2010. Retention increased from 57% in 2004 to 73% in 2010. This may have been caused by the Datatel's enforcement of pre-requisite
courses having been taken.

Analyze program budget trends and expenditures. Comment on how the program can best use budget resources.
Analyze the program's current use of staff, equipment, technology, facilities, and/or other resources. Comment on how the program can best use these resources.
Describe any additional notable program achievements (optional).

Additional Program Table Data
Future Action

Strategies to improve student achievement indicators. Specify.

Enrollment demands remain high while staffing is insufficient to meet these demands. Expansion of sections in these high demand classes should be supported in the future.

Program Analysis
After assessing student learning outcomes/impacts, student/program achievement, and the status of previous program improvement objectives (PIOs), analyze the data and any identified trends, and summarize you findings. Use these data and trends to prioritize, revise, or develop new PIOs

Describe program achievements and successes.

A significant increase in retention has been accomplished in the past 5 years. This has been accomplished despite the loss of one full time faculty. This has meant fewer students have had access to courses, but more of those students succeeded within the classes.

Redesigned student data collection sheets.

According to the evidence, what are the areas needing improvement?

Modernize and update Biology Transfer and Allied Heath programs, including curriculum updates, staffing, developing new labs that meet current industry and safety standards, purchasing modern equipment.

Program Improvement Objectives:
Objective:

Update and modernize the Biology Transfer and Allied Health programs so that they are aligned with required programs to which we are preparing these students and with anticipated directions of these programs.

Action Plan

Equipment: Modernize equipment presently used in Building 8 that can be transferred to the new Science center. Need sufficient quantities of pH meters for use in all transfer and Allied Health Science courses. Need to replace dissecting and compound microscopes; some are over 40 years old and are no longer functioning or repairable. Purchase Powerlab modules to replace the previous computer-assisted system used in transfer biology. Continue to assess equipment needs.

Science Center: Develop User Groups (completed Spring 2013 and work with architect (continuing Spring, summer and Fall 2013) to begin planning and designing the use of space in the new building (funded by Measure G Bond). Some considerations include:

1. Increasing interaction between science faculty in different disciplines by sharing a common building. This would make it possible to make efficient use of valuable and expensive equipment.

2. Need to modernize the biology lab and infrastructure to support modern equipment. Infrastructure includes ventilation, electrical grid, temperature control, wireless internet access, and safety concerns.

Staffing: Hire new faculty in the pre-health science program. There is a dire need to increase the number of anatomy and physiology sections offered as these courses become impacted on the first day of enrollment each semester. Ideally, this would include a full time faculty who would
teach a new physiology course. Many students enter this sequence having taken an anatomy course but are required to take both semesters of the present anatomy and physiology sequence to complete their requirements. If a physiology course was added these students would not be competing for seats in the year long sequence and would be able to complete their own pre-requisites in one semester. Assess Biology Lab Technician position change from 100% to 70% and in the chemistry/biology tutor center position from 50% to 30%. Up until this year we have had a 50% tutor center position and a 100% position for the biology lab technician position. Presently one person is attempting to do this with a split position.

Staffing

Apply for new faculty for anatomy and physiology courses (104, 109 and 103a/b).

Equipment (other than technology)

1. A key instrument used in all laboratory based biology classes is the microscope. Students require slides to use this instrument. At present we do not have adequate numbers of copies of a number of these slides for students to individually use them. Some slides were purchased for the transfer biology and pre-health sciences courses. This will be an on-going need.

2. Need sufficient quantities of pH meters for use in all transfer and Allied Health Science courses.

3. Need to replace dissecting and compound microscopes; some are over 40 years old and are no longer functioning or repairable. Additional microscopes are no longer useable. Many dissecting microscopes do not
have working lamps to go with the microscope.

4. Purchase Powerlab modules to replace the previous computer-assisted system used in transfer biology. The present Powerlab modules have reached an age that they can no longer be upgraded (upgrades were done without charge up prior to this by the manufacturer).

5. There is a strong need to purchase sufficient quantities of small-animal respirometers, calorimeters, and electrophoresis boxes and power supplies for use in the general biology labs.

Technology

Wireless Access to class rooms and offices Building 8. This will be addressed by new Science center, but should be part of the temporary labs and offices in the interim

Facilities

Work with User Groups and Facilities Committee to begin planning for new Science Center. On going.

Assessment Plan

How will you assess the effectiveness of your PIO?

1. Equipment purchased and implemented. Students have increased access to prepared slides in the transfer and pre-health sciences programs. This has meant that students were able to complete their assignments and have enough time to review and study slides in more depth

2. Building design developed with mutual consensus. On going
3. Assessment of Biology Lab Assistant position completed. Even prior to the completion of the new Science center this split position may be untenable. The tutor center is presently across the hall from the preparation area, but that will not be the case when we leave this building.

Which college goal(s) does this program improvement objective work to achieve? Clearly describe how your PIO will help achieve one or more of the college goals and objectives, has impact beyond the particular department, and contributes to student learning/success.

1. Through innovative programs and services, improve student learning and achievement.

PIO Assessment

Future Action

Outside Review Results

List each team members name and title.

None.

Discuss key feedback provided by team and how it was incorporated into the report.

None.

Attached Files

Biol 101A-Fall 2012 Course Assessment.pdf
SLO Assessment for Microbiology 106.docx
BIOL106 (Finney) Spring 2012 Assessment.docx
103B SLO assessment 2012 attachment.docx
103A assess f12.docx