2009-2010 Assessment Plan Report
Plan Year 2

PROGRAM ASSESSMENT REPORT
AY 2009-2010

Report Date: 11 October 2010

School/College: Arts and Sciences

Department/Program: Biology Undergraduate

Person completing the Report: Scott Nunes

1. **Overview Statement**: Briefly summarize the assessment activities that were undertaken this academic year, indicating:

   a. <u>Which program learning outcomes were assessed this year?</u>

   The Biology Department assessed the following learning outcomes.

   Program Goal 1: Upon graduation, a student will have acquired an understanding of major biological concepts and awareness of how these concepts are connected within various areas of the biological and physical sciences.

   Desired outcomes for Program Goal 1:
   1. Recognize the relationship between structure and function at all levels: molecular, cellular, organismal, and ecological.
   2. Describe the flow of genetic information, the chromosome theory of heredity, and the relationship between genetics and evolutionary theory.
   3. Recognize the ecological relationships between organisms and their environment.
   4. Evaluate the principles of evolutionary biology.

   Program Goal 2: Upon graduation, a student will have acquired the necessary problem solving, analytical, and communication skills that provide the basis for a career in the biological sciences.

   Desired outcomes for Program Goal 2:
   5. Use current research techniques to apply the scientific process by testing hypotheses through experimentation.
   6. Demonstrate the ability to understand and critically review scientific papers.
   7. Develop an awareness of careers and professions available in the biological sciences.

b. <u>Who in your department was involved in the assessment of the above learning outcomes?</u>

The department conducted an anonymous survey of graduating seniors in April 2010 to assess learning outcomes associated with its program goals. The survey was designed by a committee consisting of Mary Jane Niles, Scott Nunes, and Gary Stevens, with feedback from all faculty members in the department.

2. **Please Answers the Following Questions for Each of the Student Outcomes Assessed:**

a. <u>What did you do?</u>

Describe clearly and concisely how you assessed the learning outcomes that were evaluated this year (e.g., measures, research methods, etc.). [please use bullet points to answer this question]

The department administered a survey to graduating seniors. A total of 48 students planning to graduate in May 2010 with a BS in Biology were invited to take the survey using Survey Monkey. A total of 34 students completed the survey, and 11 of those supplemented their multiple choice responses with narrative comments.

- Questions 1-6 of the survey asked students their perception of whether program learning outcomes were being attained.
- Questions 7-11 asked students their perception of the effectiveness of courses taken in the Biology major.
- Questions 12-19 asked students about their involvement in extracurricular activities, the quality of advising, teaching and research opportunities in the department, and their future goals.

b. <u>What did the faculty in the department or program learn</u>?

Summarize your findings and conclusions as a result of the assessment indicating strengths and weaknesses in student learning demonstrated by this assessment.

A copy of the results of the survey and a copy of student comments are attached. The survey indicated strengths in learning outcomes in the following:

- Describing structure-function relationships at the molecular, cellular, and organismal level and integrating principles at these different levels to describe biological systems (survey questions #1a-c and #2, learning outcomes #1 and #3).
- Explaining the molecular and chromosomal basis of heredity and the genetic basis of evolution, and applying evolutionary principles to understanding biological systems (survey question #2, learning outcomes #2 and #4).
- Understanding and critically evaluating primary research articles and other

publications in biology (survey question #4, learning outcome #6).
- Using laboratory techniques and field methods in the scientific process and applying the scientific process to test hypotheses through investigation (survey question #5, learning outcome #5).
- Developing awareness of careers and professions available in the biological sciences (survey question #6, learning outcome #7).

The survey indicated that the following learning outcomes might benefit from strengthening:

- Describing structure-function relationships at the ecological level (survey question 1d—15.2% disagree/strongly disagree, learning outcome #1).
- Developing awareness of careers and professions in the biological sciences (student comments).

c. <u>What will be done differently as a result of what was learned</u>?

Discuss how courses and/or curricula will be changed to improve student learning as a result of the assessment. Include a discussion of how the faculty will help students overcome their weaknesses and improve their strengths.

- Strengthening student learning at the ecological level:
  - Although 84.9% of survey respondents agreed or strongly agreed that they were able to describe structure-function relationships at the ecological level, the department hopes to enhance its offerings in ecology to reinforce learning in this important area of biology. Beginning in fall 2009 the department added a concentration in ecology as an option for Biology majors. The department hopes to further develop this concentration as resources become available. Specifically, the department has a full-time line for a tenure-track faculty member that is currently being held by a term faculty member until research space becomes available for a tenure-track person. When space becomes available, the department plans to hire a microbial ecologist or environmental microbiologist. The department is also integrating an ecology component into BIOL 490-Undergraduate Seminar in Biology. Specifically, the department plans to have an ecological topic be the focus of the seminar in one of the two semesters it is offered each year.
- Improving awareness of careers and professions in the biological sciences:
  - Although 94.1% of survey respondents agreed or strongly agreed that they were aware of a variety of careers and professions in the biological sciences, some students mentioned in their narrative comments that they would appreciate more information about career options. There has been a modification in BIOL 490

Undergraduate Seminar in Biology to devote a part of the class to discussing professions in the biological sciences. Several biological or scientific student groups include exploration of careers as part of their mission and provide excellent career information to students (e.g., Women in Science, Tri-Beta, Club for Neuroscience Students, Pre-Dental Society, Pre American Medical Students Association). A total of 29.4% survey respondents indicated that they did not participate in biological/scientific student groups while at USF. The department is attempting to increase awareness of these groups and encourage participation in them to learn about career options. Specifically, the department has increased its discussion of these groups at new-student orientations.

d. <u>What student learning improvement initiatives did you implement as a result of what was learned from Year 1 assessment report</u>?
Discuss how courses and/or curricula were changed to improve student learning as a result of the Year 1 assessment. Include a discussion of how the faculty has helped students overcome their learning weaknesses and improve their strengths.

The 2008-2009 assessment report from the Biology Department indicated that according to students' grades, students were not as successful in achieving desired outcomes in lower division courses required for the major as in upper division courses. To improve student learning in lower division courses as well as BIOL 310-Genetics, a student repeating one of the courses must sign a contract at the beginning of the semester the course is repeated. The student receives counseling from an academic coach in the Arts and Sciences Dean's Office at the time he or she signs the contract, and is encouraged to seek advice from an academic coach if academic or personal difficulties arise while the course is being repeated.

3. **Attach a copy of the components of the department/program assessment plan that have been modified since its initial submission:**
    a. Program Mission
    b. Program Learning Goals
    c. Program Learning Outcomes
    d. Program Learning Rubrics aligned with outcomes
    e. Curriculum map that shows the courses that pertain to the outcome

No modifications have been made since submission of the last assessment report.

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Please return to: Provost Office by May 15, 2010

You can send your replies as either a Word attachment (to: marin@usfca.edu) or as a hard copy to: Provost Office, Lone Mountain Rossi Wing 4th floor.

If you have any questions, please contact: William Murry, Director of Institutional Assessment (wmurry@usfca.edu or x5486).

USF Department of Biology Assessment Survey

3. We welcome your comments, including those related to upper division course offerings, intersession / summer Biology courses at USF, advising support, career development support, etc.please do not refer to specific faculty members****

		Response Count
		11
	answered question	**11**
	skipped question	**23**

	Response Text	
1	USF has a huge LACK of access to job fairs and opportunities for science majors. There is little help offered unlike the business school or other colleges.	Apr 5, 2010 11:27 PM
2	More upper division courses should be offered during each semester.	Apr 6, 2010 12:31 AM
3	I think the academic advisors should be more attentive in knowing the core requirements, since if it weren't for me on a whim checking with the office to add a class I would be one class short of graduating, which could have caused me a lot of trouble in my ability to graduate and receiving financial assistance. It would also be nice to sit in on upper division courses, to help figure out if I want to take the class or if I like the teachers' teaching style. Making it easier for Biology majors to also be Biochemistry majors is also important, and being able to get a biochemistry and chemistry minor, and not having to choose just one. More information on different medical fields and what kinds of schools and medical degrees are offered in the US and elsewhere, and what to look for in medical schools to make it easier to practice in the US, since not all students interested in pursuing medicine have parents who are already in the medical field and know this information. More science based volunteer opportunities where we as students get to share our knowledge of science with the public, such as high school and grammar school students, and getting them interested in pursuing science and health-related careers. When we have an opportunity to share our knowledge, it reinforces what we already know not just to other students we're in class with, but with the public and feeling confident doing so. I enjoyed my time at USF, I very much wish I could have been able to take all the other classes I am so interested in, and the faculty are phenomenal and were very important in helping me feel confident enough to pursue the health-related fields.	Apr 6, 2010 2:45 AM

	Response Text	
4	In general, labs should be far more specific to what is learned in lecture, especially in upper division molecular emphasis classes. Constant effort should be made both in lecture and lab to relate the things learned in lab to the things learned in lecture. While it is easy to assume that most of the students know what they are doing because they have already read over the procedure, it is hardly ever the case. The educational experience in Biology would be much more effective if lab and lecture could be more seamlessly combined. It has been my experience that most Biology majors at USF know theory, but are particularly incompetent in a lab setting (some seniors don't even know how to use a pipette). It is important to shift the mindset from passive "I know what HAPPENS because of x y and z" to the active "I know how to MAKE this happen and I will DO x y and z". Also, Career Services is lacking in jobs for Biology majors. This is particularly distressing considering the fact that USF is located in one of the most booming centers for Biology in the country. More effort should be made to make connections and to network with local companies and universities to get our graduating students out into the community. Career Services has toted their job search programs and has a sort of "hands-off" attitude once they have given job-searching students their information. It would perhaps be in the interest of the Biology Department to network unique opportunities just for USF students instead of throwing them into a database to which many other universities already have access. Lastly, it would be in the interest of the department to offer more classes. As one of the students who went through the student population boom that caused many first semester juniors to be shut out of upper division classes, I saw firsthand the lack of classes offered and the effect it had on students. While the solution (adding new sections to classes that already existed) controlled some of the damage, this could be taken as an opportunity to expand the course offerings. Instead of straining the professors that the department already has, perhaps it could hire adjunct professors from various fields to teach lecture courses on special topics.	Apr 6, 2010 10:34 PM
5	I think students should be encouraged to be able to choose their advisor/switch advisers if they want.	Apr 11, 2010 11:11 PM
6	I wish the biology department offers more upper division courses to increase the choices of field. Also, I hope Biology department opens some upper division courses on summer. For organizations, they should let all the students know what organizations they can offer because some of the transferred student they do not know during orientation. Once they know, it is too late for them to join.	Apr 13, 2010 6:58 PM
7	I think that it would be great to organize some sort of an internship relationship with UCSF or other research facilities for students to utilize.	Apr 14, 2010 3:38 AM
8	I wish there were more connections to biotechnology companies outside of the school. Like how career services center offers business majors jobs off campus, I wish the biology department could offer students these opportunities too. The education I received here was great, but I still always felt lost in preparations for jobs. If we had a resume workshops for specifically for biology majors or had on campus interviews for biotech companies in the bay area would be a great.	Apr 14, 2010 5:45 AM
9	I really enjoyed most of the class I took. It would have been great if we had more ecologically related courses. It would also have been nice if there was more of a community among the biology department outside of the classroom.	Apr 14, 2010 4:34 PM
10	Following the Biology course curriculum for four years at USF, the upper division courses were the most immersive. However, more variety of these courses would have been preferable.	Apr 19, 2010 3:47 AM
11	My experience at USF has been brief but fulfilling. The professors take an interest in the success of the students which should be expected but has, in my previous educational experience, been rare.	Apr 20, 2010 5:55 PM

USF Department of Biology Assessment Survey

1. 1. I am able to describe structure-function relationships at the	strongly disagree	disagree	agree	strongly agree	Rating Average	Response Count
a. molecular level	0.0% (0)	0.0% (0)	38.2% (13)	**61.8% (21)**	3.62	34
b. cellular level	0.0% (0)	0.0% (0)	23.5% (8)	**76.5% (26)**	3.76	34
c. organismal level	0.0% (0)	2.9% (1)	44.1% (15)	**52.9% (18)**	3.50	34
d. ecological level	6.1% (2)	9.1% (3)	**57.6% (19)**	27.3% (9)	3.06	33
				answered question		**34**
				skipped question		**0**

2. 2. I am able to	strongly disagree	disagree	agree	strongly agree	Rating Average	Response Count
integrate molecular, cellular, organismal, and ecological principles to understand and describe biological systems	0.0% (0)	0.0% (0)	**67.6% (23)**	32.4% (11)	3.32	34
				answered question		**34**
				skipped question		**0**

3. 3. I am able to						
	strongly disagree	disagree	agree	strongly agree	Rating Average	Response Count
a. explain the molecular and chromosomal basis of heredity	0.0% (0)	0.0% (0)	41.2% (14)	**58.8% (20)**	3.59	34
b. explain the genetic basis of evolution	0.0% (0)	2.9% (1)	**55.9% (19)**	41.2% (14)	3.38	34
c. apply evolutionary principles to understanding biological systems	0.0% (0)	2.9% (1)	**58.8% (20)**	38.2% (13)	3.35	34
				answered question		**34**
				skipped question		**0**

4. 4. I am able to						
	strongly disagree	disagree	agree	strongly agree	Rating Average	Response Count
a. understand primary research articles and other scientific publications in biology	0.0% (0)	0.0% (0)	**52.9% (18)**	47.1% (16)	3.47	34
b. critically evaluate primary research articles and other scientific publications in biology	0.0% (0)	8.8% (3)	**50.0% (17)**	41.2% (14)	3.32	34
				answered question		**34**
				skipped question		**0**

5. 5. I am familiar with						
	strongly disagree	disagree	agree	strongly agree	Rating Average	Response Count
a. laboratory techniques used in biology	0.0% (0)	0.0% (0)	32.4% (11)	**67.6% (23)**	3.68	34
b. field methods used in biology (answer only if you took one or more field biology courses)	0.0% (0)	0.0% (0)	48.1% (13)	**51.9% (14)**	3.52	27
c. how to apply the scientific process to test hypotheses through experimentation	0.0% (0)	2.9% (1)	47.1% (16)	**50.0% (17)**	3.47	34
					answered question	**34**
					skipped question	**0**

6. 6. I am aware of						
	strongly disagree	disagree	agree	strongly agree	Rating Average	Response Count
a variety of careers and professions in the biological sciences	2.9% (1)	2.9% (1)	**55.9% (19)**	38.2% (13)	3.29	34
					answered question	**34**
					skipped question	**0**

7. 1. The following courses prepared me for the Biology courses that followed them:						
	strongly disagree	disagree	agree	strongly agree	Rating Average	Response Count
a. General Biology	0.0% (0)	2.9% (1)	41.2% (14)	**55.9% (19)**	3.53	34
b. Cell Physiology	0.0% (0)	5.9% (2)	44.1% (15)	**50.0% (17)**	3.44	34
c. Genetics	0.0% (0)	15.2% (5)	**48.5% (16)**	36.4% (12)	3.21	33
					answered question	**34**
					skipped question	**0**

8. 2. The following courses provided a foundation for my understanding of biology						
	strongly disagree	disagree	agree	strongly agree	Rating Average	Response Count
a. General Chemistry	0.0% (0)	14.7% (5)	**67.6% (23)**	17.6% (6)	3.03	34
b. Organic Chemistry	0.0% (0)	0.0% (0)	**67.6% (23)**	32.4% (11)	3.32	34
					answered question	**34**
					skipped question	**0**

9. 3. The upper-division biology courses I took						
	strongly disagree	disagree	agree	strongly agree	Rating Average	Response Count
a. enhanced my breadth in biology	0.0% (0)	0.0% (0)	11.8% (4)	**88.2% (30)**	3.88	34
b. were relevant to my career goals	0.0% (0)	11.8% (4)	29.4% (10)	**58.8% (20)**	3.47	34
c. were courses that I wanted to take	0.0% (0)	2.9% (1)	26.5% (9)	**70.6% (24)**	3.68	34
d. were chosen from among a sufficient number of options	2.9% (1)	26.5% (9)	**41.2% (14)**	29.4% (10)	2.97	34
					answered question	**34**
					skipped question	**0**

10. 4. The following enhanced the breadth and depth of my understanding of biology						
	strongly disagree	**disagree**	**agree**	**strongly agree**	**Rating Average**	**Response Count**
a. the laboratories associated with upper division courses	0.0% (0)	0.0% (0)	39.4% (13)	**60.6% (20)**	3.61	33
b. the posters, projects and presentations associated with upper division courses	0.0% (0)	8.8% (3)	**58.8% (20)**	32.4% (11)	3.24	34
c. the upper division field biology courses (answer only if you took one or more field courses)	0.0% (0)	3.7% (1)	33.3% (9)	**63.0% (17)**	3.59	27
				answered question		**34**
				skipped question		**0**

11. 5. The Biology courses I took						
	strongly disagree	**disagree**	**agree**	**strongly agree**	**Rating Average**	**Response Count**
a. required an appropriate amount of work and effort	0.0% (0)	0.0% (0)	17.6% (6)	**82.4% (28)**	3.82	34
b. addressed underlying evolutionary themes	0.0% (0)	2.9% (1)	35.3% (12)	**61.8% (21)**	3.59	34
c. incorporated USF's Mission and Values	0.0% (0)	11.8% (4)	**50.0% (17)**	38.2% (13)	3.26	34
				answered question		**34**
				skipped question		**0**

12. 6. My grade point average in Biology						
	strongly disagree	disagree	agree	strongly agree	Rating Average	Response Count
is the expected result of my ability and effort	3.0% (1)	18.2% (6)	**60.6% (20)**	18.2% (6)	2.94	33
				answered question		**33**
				skipped question		**1**

13. 7. As a Biology major at USF, I						
	strongly disagree	disagree	agree	strongly agree	Rating Average	Response Count
a. participated in biological/scientific clubs and organizations	5.9% (2)	23.5% (8)	26.5% (9)	**44.1% (15)**	3.09	34
b. made friends who share my goals	0.0% (0)	2.9% (1)	38.2% (13)	**58.8% (20)**	3.56	34
				answered question		**34**
				skipped question		**0**

14. 8. **Answer this question only if you did research with a Biology faculty member** Having participated in a research project,						
	strongly disagree	disagree	agree	strongly agree	Rating Average	Response Count
a. I understand how research is accomplished	0.0% (0)	0.0% (0)	33.3% (2)	**66.7% (4)**	3.67	6
b. I have enriched my understanding of biology	0.0% (0)	0.0% (0)	33.3% (2)	**66.7% (4)**	3.67	6
				answered question		**6**
				skipped question		**28**

15. 9. My academic adviser						
	strongly disagree	disagree	agree	strongly agree	Rating Average	Response Count
was available, informed, and helpful	0.0% (0)	5.9% (2)	38.2% (13)	**55.9% (19)**	3.50	34
					answered question	**34**
					skipped question	**0**

16. 10. The professors in the Department of Biology						
	strongly disagree	disagree	agree	strongly agree	Rating Average	Response Count
a. are excellent teachers	0.0% (0)	0.0% (0)	20.6% (7)	**79.4% (27)**	3.79	34
b. have a positive attitude toward students	0.0% (0)	0.0% (0)	20.6% (7)	**79.4% (27)**	3.79	34
					answered question	**34**
					skipped question	**0**

17. 11. My degree in Biology						
	strongly disagree	disagree	agree	strongly agree	Rating Average	Response Count
has prepared me for the next step in my life	0.0% (0)	0.0% (0)	35.3% (12)	**64.7% (22)**	3.65	34
					answered question	**34**
					skipped question	**0**

18. 1. In the coming year, I plan to				
	yes	no	Rating Average	Response Count
a. attend graduate school	40.6% (13)	**59.4% (19)**	1.59	32
b. attend professional school (e.g., medical, dental, pharmacy)	**64.5% (20)**	35.5% (11)	1.35	31
c. work in a biology-related field	**71.9% (23)**	28.1% (9)	1.28	32
d. work in a field that is not related to biology	17.9% (5)	**82.1% (23)**	1.82	28
e. other	29.2% (7)	**70.8% (17)**	1.71	24
			answered question	**34**
			skipped question	**0**

19. 2. My long-term career goal is to be				
	yes	no	Rating Average	Response Count
a. a researcher in the biological sciences	33.3% (9)	**66.7% (18)**	1.67	27
b. a health care professional	**85.3% (29)**	14.7% (5)	1.15	34
c. a teacher	23.1% (6)	**76.9% (20)**	1.77	26
d. a laboratory technician	14.8% (4)	**85.2% (23)**	1.85	27
e. none of the above	0.0% (0)	**100.0% (22)**	2.00	22
			answered question	**34**
			skipped question	**0**

20. 3. We welcome your comments, including those related to upper division course offerings, intersession / summer Biology courses at USF, advising support, career development support, etc.**please do not refer to specific faculty members**		
		Response Count
		11
	answered question	**11**
	skipped question	**23**