



## 2008-2009 Assessment Plan Report

### PROGRAM ASSESSMENT REPORT AY 2008-2009

**Report Date:** 1 June 2009  
**School/College:** Arts and Sciences  
**Department/Program:** Biology/Undergraduate Program  
**Person completing the Report:** Deneb Karentz

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

a. **Which program learning outcomes were assessed this year.**

Learning outcomes associated with Program Goal 1 were assessed during this first year.

**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:

- Recognize the relationship between structure and function at all levels: molecular, cellular, and organismal.
- Describe the flow of genetic information, the chromosome theory of heredity and the relationship between genetics and evolutionary theory.
- Recognize the ecological relationships between organisms and their environment.
- Evaluate the principles of evolutionary biology.

b. **Who in your department/program was involved in the assessment of the above learning outcomes**

See attached report prepared by Deneb Karentz, Biology Department Chair, in consultation with John Sullivan, Professor and Fletcher Jones Endowed Chair of Biology



## 2008-2009 Assessment Plan Report

As further discussed in the attached data report, department review of grade distributions will be helpful in evaluating our current course sequences, verifying the content of pre-requisite courses, and may aid in the establishment of other program assessment criteria.

**c. What will be done differently as a result of what was learned?**

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.

The department did not have sufficient time to fully analyze and discuss the data collected from the new Assessment Plan this year. A more in depth and extended evaluation will be conducted in the second year. We have been continually and successfully improving the Biology program by adjusting/revising the curriculum whenever necessary. This has included a complete revision during the transition from 3-unit to 4-unit courses at USF, additional consideration of changes in response to the 2007 Program Review and modifications initiated by faculty and student comments. The Biology program is quite successful with a large number of majors and students establishing successful careers after graduation. We do not anticipate a need for major changes in the near future. Two existing policies in particular have improved and maintained student success: 1) enforcing current pre- and co-requisites for courses through Banner registration restrictions and 2) limiting students to only two attempts at a single course. These two measures have gone a long way towards eliminating the previously large number senior-level students who could not achieve the 2.0 GPA in the Biology major that is necessary to graduate from USF, even though they had taken all of the required courses.

**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

None of these documents listed above has been revised since October 2008, but a copy of the existing Undergraduate Program Goals and Student Learning Outcomes and Assessment Plan is attached. We anticipate modifications to some of these documents may be made in the 2009-2010 academic year.



## 1st Report on the USF Department of Biology Undergraduate Program Assessment Plan

June 2009

In October 2008, the Biology Department at the University of San Francisco established its first academic program Assessment Plan. The Assessment Plan approved by the faculty provides a means for the quantitative evaluation of the program goals set for students graduating in Biology from USF:

**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.

**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.

Each program goal has specific learning outcomes associated with it (see Assessment Plan document submitted in October 2008 and attached after the Appendices at the end of this document). An earlier list of learning outcomes was revised at the same time that the new Assessment Plan was created in order to include only those outcomes that could be quantified. This report will address the assessment of Program Goal 1 and describe the potential implementation of assessment of Program Goal 2. This document was written and submitted by the outgoing Biology department chair, Deneb Karentz, in consultation with Professor John Sullivan, the Fletcher Jones Endowed Chair of Biology. Owing to the nature of the assessment method (i.e., student grades) and thus the timing of completing the assessment after the end of the spring semester, it was not practical to include full faculty review of this first report. The report will be forwarded to the Biology faculty and will provide a basis for discussion of both our curriculum and the initial Assessment Plan during the 2009-2010 academic year.

### Assessment of Program Goal 1

The assessment plan for Program Goal 1 has four parts that are outlined and discussed below:

1. *At least 50% of students should complete their Biology courses with a grade point average (GPA) of 2.5 or higher.*

A total of 51 students graduated from USF as Biology majors in the 2008-2009 academic year (12 students in Dec 2008 and 39 students in May 2009). Less than 6% (three out of the 51) graduates had Biology GPAs less than 2.5 (Figure 1). The Biology GPA consists only of grades in Biology courses taught through the USF Biology Department. Transferred Biology courses from other institutions, other supporting USF science courses (Chemistry, Math, Physics), Core courses and electives were not included in the Biology GPA calculations. The mean Biology GPA was  $3.16 \pm 0.44$ .

3. *The percentage of students earning a C or higher in the capstone Evolution course will be monitored to evaluate the achievement of learning outcomes.*

Evolution is offered every fall and spring and taken in one of the last two semesters of matriculation. A total of 56 students took evolution in the 2008-2009 academic year (30 in the fall and 26 in the spring). 73% of students earned a grade of C or higher (Figure 3). However, students in Evolution had the second lowest mean course grade of all Biology classes taught during the year (Figure 4). The only course with a lower mean is the first semester freshman-level General Biology I. The department will need to examine this situation and determine how to resolve the issue of such low grades in our capstone course.

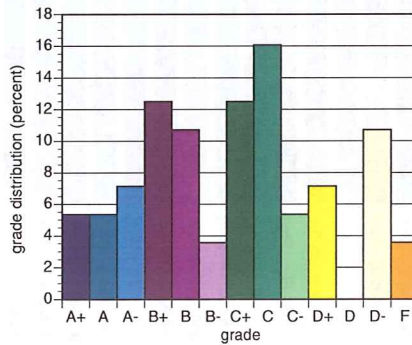


Figure 3. Distribution of grades in combined fall and spring semesters of Evolution (BIOL414), the capstone course of the Biology curriculum.

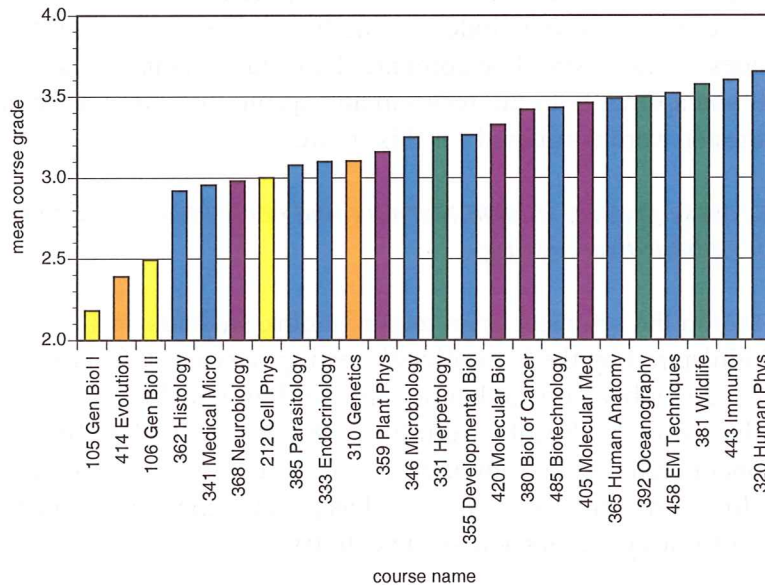


Figure 4. Mean course grades for all Biology courses offered in the 2008-2009 academic year ranked from lowest to highest. Yellow: lower division required courses (General Biology I and II plus Cell Physiology), orange: upper division required courses (Genetics and Evolution), red: upper division elective lecture-only courses, blue: upper division elective courses with labs, green: upper division field courses).

## Assessment for Program Goal 2

Assessment for Program Goal 2 has two evaluation sections (see below). The planned time frame for initiating these assessments is during the next academic year, 2009-2010. Suggestions for implementing assessment are provided here, but have not yet been discussed by the Biology faculty.

1. *Representative lab reports, field notebooks and journals will be collected and reviewed by faculty using an appropriate rubric. The rubric will be developed to evaluate common components across assignments required in Biology courses.*

Before this evaluation can be implemented, the department will have to review course syllabi to identify courses that require students to submit lab reports, field notebooks and journals; and develop an appropriate rubric. A draft example for assessment is included here in Appendix A.

2. *Data will be collected on the career paths of alumni in order to determine what percentage of graduates*
  - *Acquire jobs in industry (e.g., biotechnology, consulting).*
  - *Complete teaching credentials and/or enter teaching positions.*
  - *Continue on to graduate programs in biological sciences.*
  - *Pursue advanced degrees in health professions (e.g., medical, dental, pharmacy, veterinary).*

To accomplish a quantitative assessment of part two, an exit survey will be conducted for graduating seniors to gain insight into their perception of the education they received in Biology and to document their immediate plans after graduation. A draft example survey is attached as Appendix B.

An alumni survey will also be conducted to learn what the longer-term achievements are for USF Biology graduates. We anticipate that accomplishing this portion of the assessment plan will be challenging, as it has traditionally been difficult to collect data on alumni. Future assessment plans could include a follow-up employer survey to evaluate student competencies.

**Appendix A.** Example rubric for evaluating student writing assignments in Biology. Table modified from <http://www.teachersnetwork.org/dcs/sixflags/lesson5.htm>.

	<b>Excellent</b>	<b>Good</b>	<b>Fair</b>	<b>Failing</b>
<i>Meaning:</i> the extent to which the assignment exhibits sound understanding of the activity (e.g., field trip, lab exercise)	Makes clear connections between information in the text/lecture and the assigned task	Makes general connections between information in the text/lecture and the assigned task	Makes limited connections between information in the text/lecture and the assigned task	Conveys a confused or inaccurate understanding of the information in the text/lecture and the assigned task
<i>Development:</i> the extent to which ideas are elaborated using specific and relevant evidence from lectures/text and class participation without plagiarizing.	Develops ideas clearly and fully making effective use of a wide range of relevant and specific details from lectures/text and class participation	Develops ideas clearly and consistently, using relevant, specific details from lectures/text and class participation	Develops some ideas more fully than others, using undeveloped, specific and relevant details from lectures/text and class participation	Ideas are incomplete or largely undeveloped, and references to the text are vague or unjustified
<i>Organization:</i> the extent to which the assignment exhibits coherence.	Maintains a clear and appropriate focus, exhibits a logical and coherent structure consistent with standard scientific writing formats	Maintains a clear and appropriate focus, exhibits a logical sequence of ideas but may lack internal consistency or does not conform to standard scientific writing formats	Fails to maintain an appropriate focus, may include some inconsistencies; shows minimal organization and little detail to format	Shows minimal focus or organization and lacks scientific format
<i>Language Use:</i> the extent to which the assignment reveals awareness of purpose through effective use of words, sentence structure, and sentence variety	Is stylistically sophisticated, using language that is precise, engaging and scientific, varies sentence structure and length of sentences	Uses language that is fluent, with awareness of purpose and scientific style, occasionally makes effective use of sentence structure and, or length.	Relies on basic vocabulary, exhibits some attempt to vary sentence structure or length for effect, but with uneven success, lack scientific style	Uses language that is imprecise or unsuitable, demonstrates minimal ability to construct appropriate sentences.
<i>Conventions:</i> the extent to which the document exhibits conventional spelling, punctuation, paragraphing, capitalization, grammar, and usage.	Demonstrates knowledge of conventions with essentially no errors, even with sophisticated language	Demonstrates knowledge of conventions exhibiting occasional errors	Demonstrates partial knowledge, exhibiting occasional errors that do not hinder comprehension	Demonstrates a lack of knowledge, exhibiting frequent errors that make comprehension difficult
<i>Technology:</i> the extent to which student exhibits facility navigating the Internet for information, locating peer-reviewed publications, using the word processing program, spreadsheet formatting, data analyses, and other technology.	Clearly navigates the Internet and finds the relevant information, creates a document in perfect academic format with scientific conventions of data presentation and literature citations	Navigates the Internet efficiently and finds relevant information, creates a document in correct academic format with scientific conventions of data presentation and literature citations	Navigates the Internet and finds relevant information, creates a document in academic format with scientific conventions of data presentation and literature citations, but some errors.	Is not able to find relevant information from the Internet, creates a document in partial academic format with scientific conventions of data presentation and literature citations, but with errors.

**Appendix B.** Sample exit questionnaire for graduating Biology students (modified from [www.ithaca.edu/hs/depts/envstudies/docs/exitsurvey.doc](http://www.ithaca.edu/hs/depts/envstudies/docs/exitsurvey.doc)). Survey will be administered through Blackboard.

Dear Senior Biology Major,

The USF Biology Program is committed to the goal of providing the best possible curriculum and instruction to prepare students for success in their career goals. Careful assessment of the Program and tracking the careers of alumni are necessary to achieve this goal. Your effort in completing this questionnaire will be appreciated and will facilitate the assessment process needed to continue to improve the Biology Program at USF. Please complete this survey and thank you for your participation.

Please indicate your satisfaction with the following items where 5 = very satisfied, 4 = satisfied, 3 = neutral, 2 = dissatisfied, 1 = very dissatisfied.

1. Course content offered in the USF Biology program:
2. Overall quality of instruction:
3. Attitude of faculty toward students:
4. Course content and quality of instruction in required courses outside of Biology:
5. Availability of your advisor:
6. Value of information provided by your advisor:
7. Preparation you received for the future:
8. Lab activities and field trips:
9. Your development of research skills:
10. Your development of quantitative skills:
11. Your understanding of Biology:

Please respond briefly to the questions below:

What aspects of education in the USF Biology Program have been most positive and helpful to you?

How could your education in the Biology Program have been improved?

How important was research or internships?

Any other comments you would like to add about the questions above or anything else?

What are your plans for the coming year?

What are your long-range career goals?

The Biology faculty thank you for taking the time to complete this survey.



## Department of Biology Undergraduate Program Goals and Student Learning Outcomes

October 2008

### *Program Goals*

At the completion of the Bachelor of Science degree in the Department of Biology, it is the intention that a graduate will have a strong foundation for lifelong learning and career development by having acquired:

1. an understanding of major biological concepts and an awareness of how these concepts are connected within various areas of the biological and physical sciences; and
2. problem-solving, analytical, and communication skills that provide the basis for a career in the biological sciences.

In addition, it is intended that USF Biology graduates will have a strong appreciation of science as an integral part of society and everyday life, particularly so that they can develop an informed scholarly personal position on contemporary social and ethical issues (e.g., environment and medicine).

### *Outcomes and Assessment*

Biology majors will learn specific skills and knowledge that will enable them to:

Learning Outcomes	Assessment
Recognize the relationship between structure and function at all levels: molecular, cellular, and organismal.	Students participate in class discussions, complete assigned projects, take quizzes and examinations, maintain journals, take lab practicals, prepare research papers or give oral presentations.
Describe the flow of genetic information, the chromosome theory of heredity and the relationship between genetics and evolutionary theory.	Students participate in class discussions, complete assigned projects, take quizzes and examinations, maintain journals, take lab practicals, prepare research papers or give oral presentations.
Recognize the ecological relationships between organisms and their environment.	Students participate in class discussions, complete assigned projects, take quizzes and examinations, maintain journals, take lab practicals, prepare research papers or give oral presentations.
Evaluate the principles of evolutionary biology.	Students participate in class discussions, complete assigned projects, take quizzes and examinations, maintain journals, take lab practicals, prepare research papers or give oral presentations.
Demonstrate the ability to understand and critically review scientific papers.	Students present a critical analysis of the primary literature in oral or written format.
Develop an awareness of careers and professions available in the biological sciences.	Tracking the career paths of alumni.





## USF Department of Biology Undergraduate Program Assessment Plan October 2008

**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.

### *Learning Outcomes Associated with Program Goal 1*

- Recognize the relationship between structure and function at all levels: molecular, cellular, and organismal.
- Describe the flow of genetic information, the chromosome theory of heredity and the relationship between genetics and evolutionary theory.
- Recognize the ecological relationships between organisms and their environment.
- Evaluate the principles of evolutionary biology.

### *Assessment Methods for Program Goal 1*

Assessment of the achievement of Program Goal 1 will be initially based on grades in coursework as indicated in the Program Matrix (page 2) since grades in the designated courses are directly related to student learning.

1. One metric for indicating that the Biology curriculum is successfully promoting student learning is if at least 50% of students complete their Biology courses with a GPA of 2.5 or higher.
2. The first four Biology courses in the curriculum are sequential and require specific grade prerequisites to progress from one to the next: General Biology I (BIOL105, minimum grade C-), General Biology II (BIOL106, C-), Cell Physiology (BIOL212, C) and Genetics (BIOL310). A minimum grade of C is required in Genetics to proceed into the third year of the Biology program. Since grades in these courses are associated with all of the learning outcomes outlined in the Program Matrix above, an analysis of students earning the minimum and higher grades in these four initial successive courses will be used to assess success in student learning and progression towards completing the Biology Program.
3. The percentage of students earning a C or higher in the capstone Evolution course will be monitored to evaluate the achievement of learning outcomes. Target values for curriculum improvement will be determined based on review of archival data.
4. In addition to course grades, student learning and achievement of Program Goal 1 will be evaluated with standardized testing. In the semester prior to graduation, students will take the Major Field Test in Biology administered by the Educational Testing Service (ETS) (<http://www.ets.org>). This exam will provide feedback on student learning of biological facts and concepts, as well as testing for analytical skills. Results from the ETS exam will allow for evaluation of the various component areas covered by the exam (e.g., cell biology, organismal biology, population biology, analytical skills), as well as provide the ability to compare results for USF students to Biology majors across the country.

*Time Frame*

- Evaluation of student assignments will be completed every two years.
- An exit survey will be conducted annually for graduating students.
- An alumni survey will be conducted every 3-5 years.

*Who Will Do the Assessment*

Department Chair and appointed committee.

*How Will Data be Used to Improve Program or Revise the Curriculum?*

On an annual basis, the Biology Department Faculty will review and discuss the data collected from the above assessment findings to devise and implement appropriate changes to the curriculum.