

Annual Key Assessment Findings and Curricular Improvements
Department of Biology
Undergraduate B.A./B.S. Program in Biology
AY 2010-11

Key Assessment Findings

There were 11 students who took the undergraduate comprehensive examination in 2010-11 (Table 1). All eleven of those students passed this key assessment milestone for their B.S. or B.A. degree in Biology.

Table 1. Undergraduate Comprehensive Examination Data from AY2010-11

	Fail		Pass		High Pass		TOTAL
	#	%	#	%	#	%	
Biology Major	0	0.00%	11	100.0%	0	0.00%	11

Table 2. Student Learning Assessment Rubric of Senior Comprehensive Exams from AY2010-11

Trait	Level						Mean	SD	Total N
	Exceeding Expectations (3pts)		Meeting Expectations (2pts)		Below Expectations (1pt)				
	N	%	N	%	N	%			
1) Proficiency in curricular content and biological concepts	2	18%	9	82%	0	0%	2.18	0.40	11
2) Written presentation of scientific topics	2	18%	9	82%	0	0%	2.18	0.40	11
3) Effective use of peer-reviewed scientific literature	1	9%	10	91%	0	0%	2.09	0.30	11

Note: 1) The "N" represents the number of students at each level of performance for each trait.

2) The "%" represents the percentage of the number of students falling at the level performance for each trait against the total number of students.

3) The mean is the average of all scores across the levels within the trait.

4) The standard deviation (SD) is the measure of the variability of the data set, indicating how "spread out" these data are from the mean value.

This was the second year the Biology Department used our established assessment rubric for senior comprehensive examinations. All of the students met or exceeded expectations in all categories of the examination.

Curricular Improvements

The Biology Curriculum Committee undertook a comprehensive curriculum review in 2009. We administered a written survey to sophomore, junior and senior undergraduates, surveyed the biology faculty regarding laboratory skills critical for students of biology, scrutinized syllabi from our required courses, and examined major requirements for biology majors at comparable institutions. We also inspected tracking sheets from all of the majors in Arts and Sciences to see distribution and major requirements in other B.A. and B.S. degrees. The data from these various sources was examined first by the committee and then discussed over the course of several biology faculty meetings. The outcome of all of these deliberations led to six major changes in the curriculum being adopted by the faculty in the fall of 2010. A major change in course content/sequence reflects the goal of having the students grow as scientists in a progressively more complex series of laboratory experiences from freshman to sophomore years. In addition, we wanted to remove some significant overlap in course content, to provide some flexibility to students in the pursuit of minors or study abroad experiences, and to emphasize the mathematical and inquiry-based pedagogy that has become the norm in higher science education. Here are the six changes:

1. Make the sophomore required course Biol 207--Genetics a 3-credit course without a laboratory. Replace the 1-credit laboratory with a new 3-credit sophomore laboratory course (see #3 below).
2. Remove Biol 210/218--Molecular and Cell Biology from the curriculum since it significantly overlaps with the content of Biol 105/106--Mechanisms of Life.
3. Add a two-semester sophomore lab sequence: Biol 217--Molecular Genetics and Protein Engineering (3 credits) and Biol 317--Investigations in Molecular Cell Biology (4 credits). The innovation with these courses is multi-fold. The content will emphasize quantitative aspects of biology. The experiments will be progressively sophisticated cutting-edge biology where the students will have some freedom in deciding what to investigate and how to design the experiments. There will be significant emphasis on developing problem-solving, writing, and oral presentation skills, as well as teaching the students how to critically interpret the primary scientific literature. All of these skills are assessed in our Biology senior comprehensive examinations.
4. Remove the two "Science and Biology Electives" in the BA/BS degrees and add two "Free Electives". All other Arts and Sciences degrees do not include distribution requirements for the area in which a student is majoring (e.g. Psychology students do not have a social science distribution requirement). These added free electives will provide flexibility for our majors to pursue minors and allow them to meet their language requirements without incurring excess courses if they do not test into the intermediate level of the language.

5. Make Biol 518--Physiology a biology elective and not a required course. Students who are interested in going to medical school as well as students who are not interested in independent research will be advised to take this course. No specific biology courses would be required in spring of junior year providing a study abroad possibility.

6. Allow exceptional students to take Research Problems in Biology for a third semester. This course provides our students with practical, real-world experience in original biology research. Students work on independent projects in faculty laboratories and are able to develop their scientific skills by experimentation, reading journal articles, working closely with the laboratory community of graduate students, and presenting their work in written and oral formats. Students who are making significant progress on their research would be allowed to receive credit for a third semester of this course sequence.

In addition to the improvements detailed above, there were also 3 new upper-level elective offerings introduced into the undergraduate curriculum during this academic year. These courses can be used to fulfill requirements for our undergraduate degrees, and they are also part of our new Master's in Biotechnology program. This program will allow students who are successfully completing all of the requirements for a B.S. or B.A. in Biology to earn an M.S. in Biotechnology by taking additional courses during junior and senior years plus one additional year of coursework. The new courses are Biol 579 Principles and Practice of Biotechnology, Biol 580 Entrepreneurial Biotechnology, and Biol 589 Introduction to Nanobiotechnology. These courses provide more options for our students to explore advanced biology in depth as they meet their biology electives requirement for their degree.