

ASSESSMENT FOR UNDERGRADUATE MAJORS

LEARNING OUTCOMES FOR UNDERGRADUATE BIOLOGY MAJORS

Students should be able to satisfy the Knowledge, Skills and Personal Development outcomes listed below, and be able to satisfy requirements in these areas:

A. Knowledge

1. Describe the origin and evolution of life on Earth, appreciate the diversity and hierarchy of life, and define the evolutionary processes underlying that diversity.
2. Demonstrate skills in mathematics, chemistry and physics, applying them in biological contexts.
3. Describe and interpret life processes at all levels, from molecular biology through whole ecosystems and the biosphere.
4. Demonstrate ability to describe and discuss the technological applications of biological knowledge.

B. Skills

1. Demonstrate the ability to use the scientific method through lab exercises and research projects, including interpreting statistical results in biological research.
2. Evaluate the primary literature, both in print and electronically, and demonstrate the ability to use these in interpretive scientific writing.
3. Apply skills to collect and process data using appropriate instrumentation
4. Demonstrate the ability to discuss the importance of quality control in data collection and reporting.

C. Personal development

1. Demonstrate the ability to work in collaboration with others and an appreciation of these efforts as part of the collaborative nature of science.
2. Describe the numerous roles that biology plays in human societies and be able to defend the importance of that knowledge in everyday life.

These outcomes are diagrammed in our **Curriculum Map for Undergraduate Majors**

(K = Knowledge/comprehension, A = Application/Analysis, S = Synthesis/Evaluation):

		Required Courses							Elective Courses						
		BIOL 1600	BIOL 1710	BOT 2050	ZOOL 2040	BIOL 2550	PSLY 2040	BIOL 3040	BIOL 3050	BIOL 4520	BIOL 3690	BIOL 4450	BIOL 4510	BIOL 4730	PSLY 4210
A. Knowledge															
1.		K	K	K	K/S		K/A/	K/A		K/A/		K/A/S	NA	K	
2.		K	K	K	K/S	K/S	K/A/	A	A	K/A	K	K/A/S	K/S	K/A	
3.		K	K/S	K	K		K/A	K/A	S	K/A		K/A			
4.			K	K	K	K/S	K/A/	A	A	K/A/	A/S	K/A/S	K/S	K	
B. Skills															
1.		K/A	K		K/A/S	K	K/A/	NA	S	K/A/	A/S	K	NA		
2.			NA		K/A/S	K	K/A	A/S	A	A/S	A	K/A/S	K/A/S		
3.		K	K/A/S		K/A	K	K/A/		A	K/A	A/S	NA			
4.		K	K		K/A		K/A/		S	K/A/	A/S	K			
C. Personal Development															
1.		K/A	K	K	K	K	K	K/A	K	K		K	K	K	
2.		K/A	K	A	K/A	K	K/A		A	K/S	A/S	K/A	S	S	

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What we looked at:

Objective: Biology 1710 is the gateway course for the Biology major. The assessment was designed to determine the increase in student content knowledge over the semester. The assessment instrument is administered by course instructors at the beginning (Pre-Test) and at the end (Post-Test) of the semester for each section of Biology 1710. This assessment instrument was last revised in the Fall 2001 semester by the course instructors. However, the collection of the results from this assessment was not put in a form that would allow for comparisons in learning between semesters.

How we assessed it:

Performance criteria: An average increase of at least 25% in student scores will be considered satisfactory. We converted the data to Normalized Learning Gains for better comparisons of the assessment across semesters.

What we found:

Results: Evidence from the Biology 1710 Pre- and Post-Test assessment shows that students are learning many of the key concept components required for majors. This can be demonstrated by the 22.6, 18.4, 19.6 percent increase in the Post-test scores compared to the Pre-Test score over years 2007, 2008 and 2010, respectively.

These results are also demonstrated by the new measure of Normalized Percentage Learning Gains. In 2010, the change in the mean percentage for all four sections from the Pre-Test scores to the Post-Test scores produced a 19.6% increase. The 2010 Normalized Percentage Learning Gain (NPLG) produced an overall 30.4 gain, which was a 3.5 increase over year 2008. The 2010 data was broken into day and evening sections (two of each) showing a key difference in this outcome. The Day section had an increase of 26.4% and a 41.1 gain for while the Evening section had only an increase of 11.3% and a 20.3 gain. This is the first time that this assessment data has been evaluated in this manner, but is of interest as the Day and Evening courses are taught in differing formats. The 2010 assessment data are currently shown as the change in the mean percentage and the Normalized Percentage Learning Gain. When the previous years scores (2007 and 2008) are converted to the change in this way, the mean percentage formats the results are 22.4% and 18.4%, respectively. These years yielded a normalized percentage learning gains of 34.5 for year 2007 and 26.9 for year 2008. The 2010 assessment data showed a 1% increase in the change in the mean percentage and a 3.5% increase in the Normalized Percentage Learning Gain over the 2008 data. Because no measurement of variance was given in the prior data sets, however, this may not present any real difference.

What it means:

Interpretation: Evidence provided from Biology 1710 Pre-Test and Post-Test Assessment indicate that students are learning many of the key concept components required for majors.

What we're going to do about it:

Action: Currently, we cannot determine the exact items in which students did well at this time because all pre- and post-tests have not had an item analysis done. In an effort to assist with the question of achieving learning outcomes, it may require the Curriculum and Assessment Committee to address revising or changing this assessment tool or adding additional assessments. One method to address this is to have concept-testing questions embedded in regular coursework (e.g., through exams, quizzes, or homework) using an internal evaluation. Additional data collection and evaluation is essential for this course. The revision of Biology 1710 course is currently in discussion and evaluation by the course instructors. The conclusions from the revision could also affect the current assessment. The current data

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from students entering CSU from high school should be used as a baseline and used to compare with outcomes from transfer students. The latter are a significant proportion of our student population, but do not lead to any assessment data by this metric because they do not complete the Biology 1710 course.

To accomplish this, the sections Pre/Post test for Biology 1710 should be embedded in the exams and in later classes. It is not certain that all of the concepts from the course are being retained sufficiently well to be effectively assessed after the end of the term. The current data showing the differences in the Day and Night courses may also point to potential changes in pedagogy for the course.

What happened:

Feedback: We are going to begin to embed sections of the assessment in the Biology 1710 exams starting in the Fall of 2012. This will assist in determining if students have mastered the concept knowledge. This data will also be compared to the same data from the formal course assessment.