

# Academic Assessment Plan

(BIOLOGY, BS and BA)

(April, 2015)

## Program Goals (3-4)

*(Program goals are broad general statements of what the program intends to accomplish and describes what a student will be able to do after completing the program. The program goals are linked to the mission of the university and college.)*

1. Foster the scientific curiosity of students about biological sciences.
2. Communicate the current state of knowledge and technology to students.
3. Nurture critical thinking, reasoning, and problem-solving abilities.
4. Enhance students' communication skills for communicating scientific ideas.
5. Prepare students to achieve academic and professional success.

## Student Learning Outcomes (6-8)

*(Student Learning Outcomes are defined in terms of the knowledge, skills, and abilities that students will know and be able to do as a result of completing a program. These student learning outcomes are directly linked to the accomplishment of the program goals.)*

The following learning outcomes mirror those proposed in several recent reviews of biology pedagogy. They apply to the both the introductory biology course and to completion of the department's common core of courses, cell biology, genetics, evolutionary biology, and ecology.

1. Show that you can understand data that support the hypothesis that all organisms are genealogically related including the recognition that all organisms are cellular and that they share the same basic genetic system.
2. Show that you can understand data that support the hypothesis that all organisms need energy and a source of building blocks to maintain themselves, grow, and reproduce.
3. Show that you can understand data that support the hypothesis that all organisms use information to maintain themselves, grow, and reproduce, and that that information can both stored genetically and be received from the environment.

4. Show that you can understand data that support the hypothesis that all organisms interact both with other organisms and with the physical components of their environment and that these interactions affect their ability to maintain themselves, grow, and reproduce.
5. Show that you can distinguish data-supported interpretations of biological systems from anecdotal information.
6. Show that you can understand and use quantitative methods for explaining how biological systems work. This will include graph interpretation, table interpretation, and basic mathematical formulas.
7. Show that you can apply the information that has been presented during the course to novel situations.

#### **Process for Assessing each Student Learning Outcome**

*(A process must be defined and documented to regularly assess student learning and achievement of student learning outcomes. The results of the assessment must be utilized as input for the improvement of the program.)*

1. **Timeline:** The Department plans to use a two-step approach in designing its assessment program. This is because we are implementing a change in our curriculum for both our BS and our BA that will begin in the fall of AY 2016-2017 (see below). We will have one assessment process in place for AY 2014-2015, and it will continue from then forward. We will add an assessment system based on our new curriculum to be initiated in AY 2016-2017 going forward. Step 1 data will be collected and compiled from a subset of majors at the end of each academic year. Step 2 data will be collected from freshmen when they take the new Biology for Majors, BIOL 1584, at the beginning of the semester and at the end, and once again when they have entered their senior year and after they have completed the Biology Majors' Core of Cell Biology, General Genetics, Evolutionary Biology, and General Ecology. This final assessment will be called the Biology Majors' Capstone Exam and will be a requirement for graduation. Data will be compiled in aggregate comparing performance at the beginning of Biology for Majors with performance at the end of Biology for Majors and with performance on the Biology Majors' Capstone Exam. The first time complete Step 2 data can be expected will be at the end of AY 2020-2021. However, data collected for freshman biology can be reported by the end of AY 2016-2017, as will data collected from a subset of seniors voluntarily taking a version of the Capstone Exam during AY 2016-2017, AY 2017-2018, AY 2018-2019, and AY 2019-2020.
2. These are the two assessment protocols:
  - a. Step 1. A substantial proportion of our majors take the MCAT exam, a national exam for students preparing for application to medical school. While this population is not completely representative our majors, the data will allow

comparison between cohorts of our students and between our students and students in a national pool. We will present the scores from our most recent cohort of students, compared the last three cohorts at the end of each AY.

- b. Step 2. We will be using exams from test banks from McGraw-Hill, the publisher of the text being used in Biology for Majors. In addition to the questions in the test banks, we can customize our own questions as well. The Exams will be used for formative assessment at the beginning of Biology for Majors and as the final Exam in Biology for Majors. Biology for Majors and Capstone Exams will be drawn from questions having a Bloom's Index level of 3 or higher and from areas associated with Cell Biology, Genetics, Evolutionary Biology, and Ecology. Students will be able to take the Capstone Exam over until they reach a score of at least 60%; however, only the score on the first attempt will be used for assessment. This requirement is designed to encourage students to take the Capstone Exam seriously. Exams in Biology for Majors will be given face to face, and the Capstone Exams will be delivered online, with a set of randomly drawn questions from each subject area at the same Bloom's Index levels
2. Results will be compiled each year and reported to the Dean. Reports will include the most recent year's data compared to those for the previous four years.
3. The results of the MCAT will be compared from year to year to watch if there is any decrease in student performance. If there is, the department will revise the curriculum to try to bring the results back up. When Stage 2 is in place, the department will look to see if there is improvement in student performance between the start of Biology for Majors and the end of the semester. If there is no improvement or slight improvement, the course will be modified to try to get a better outcome. The department will also monitor the assessment taken at the end of the curriculum to determine if student performance has improved since completion of Biology for Majors. Again, if improvement is not found or it is judged to be insufficient, the areas of the Core disciplines that show weakness will be addressed by modifying the appropriate courses.