

Assessment Report for BGES Undergraduate Programs in BIOLOGY: 28 May, 2004

1. Goals

Biology majors will possess a broad general knowledge of the fundamental facts and principles in all of the major areas of Biology by the end of their senior year, as well as advanced knowledge in the major areas of Biology, as defined by the GRE Advanced Biology subject test.

This goal was developed by the Department: initially by the chair and associate chairs, undergraduate program directors, and the Undergraduate Committee on Curriculum & Academic Standards [UCCAS], then discussed and approved by a formal vote at a faculty meeting. The decision to use the subject areas based on the areas of the Graduate Record Examination was made in 1996, when the first steps in Departmental assessment evaluations were begun. No changes in the goals have been made since that time.

2. Outcomes

The Department decided to define outcome measures as *satisfactory improvement in performance on a standardized test from entry to completion of the program*. This outcome measure was adopted by the Department in the same way and at the same time as the determination of the goals.

3. Research

The current testing procedure (since Fall, 2001) uses an objective exam of 100 multiple-choice questions (randomly sampled from a test bank of 900 questions), divided into 6 areas in the following proportions: 17% Biochemistry & Cell Structure/Function; 17% Genetics & Molecular Biology; 17% Evolution; 16% Ecology; 18% Botany; 15% Zoology. The questions used in the pool were selected from faculty input and then subsequently approved by faculty in each area.

In the first versions of the exam (administered through WebCT), the random sampling from the pool of questions for each category was done for each student. Severe problems with system backup/recovery in older versions of WebCT, which resulted in significant losses of data, forced us to adopt a simpler approach. We now perform the random sampling from the test bank only once each semester, so that all students in a given semester write the same exam.

The exam is administered at three time points (entry, early, and late) in a student's career: at entry, operationally defined as the beginning of the first required course for majors (BIO 200, Introductory Biology I), at the end of the introductory sequence (BIO 202, Introductory Biology II), and just before graduation. The last point is administered by requiring all majors to complete a 0-credit course (BIO 499, Exit Evaluation) that consists solely of the assessment examination before graduation. In the introductory biology sequence (BIO 200 & BIO 202), students are exposed to concepts in each of the six major areas into which the exam is subdivided. This allows us to attempt to assess both overall outcomes and performance in each of the subject areas.

All of these direct measures are collected as aggregate values for the entire set of students writing the exam in each semester. No attempt is made to track the performance of individual students.

In addition to these direct outcome measures, indirect evidence sometimes comes in the course of informal exit interviews that arise during the last meeting before graduation that each major has with the Biology Undergraduate Program Director [in the BGES Department, all Biology majors are advised by the same person].

4. Findings

A set of standard statistics are calculated for each set of data and appropriate comparisons are made. In particular, overall average scores always are compared among the entry, early, and late categories as new data accumulate each semester. The latest data (from Fall, 2001, through Spring, 2004) show an appropriate increase in average score from 27.2 at entry (based on data for N = 467 students), to 37.5 at the end of the introductory sequence (N = 371 students), and 46.0 at exit (N = 41). However, only the difference between entry and exit is statistically significant (at a 95% confidence level).

5. Review

Results of the data analysis are reviewed by the Undergraduate Program Director, Associate Chair, and Chair, as well as by members of the Department's undergraduate committee (UCCAS). Any significant findings are reported to the faculty generally for discussion and action.

6. Actions

The results of both the direct and indirect assessment of student outcomes suggested a general performance weakness in the area of genetics. After discussion within the UCCAS, the Department discussed and adopted a curricular change involving the creation of a two new courses (BIO 310, Genetics, and BIO 311, Genetics Recitation) that now (since Fall, 2004) form part of the allowable core requirements for Biology majors.

Anticipated difficulties in ensuring student compliance with taking the outcome assessment exam just before graduation resulted in the creation of the Exit Evaluation course requirement for the major, adopted in Fall, 2002 [after reluctant approval by the Arts & Sciences Curriculum Committee].