ASSESSMENT REPORT FOR BIOLOGY MAJOR-B.S.
Fall 2007 – Spring 2008

I. Mission of the Program

The University recognizes its special obligation to undergraduate education and to the preparation of undergraduates for advanced degrees or challenging professional careers. The mission of the Biology programs is to provide students with a high quality science education that includes experience with research and field projects. The program provides a scientific and technical background that empowers students to successfully pursue science and technology careers, or, proceed on to advanced graduate studies.

II. Program Goals

Our goal is to develop broadly literate students with a comprehensive knowledge of the biological sciences with the ability to critically analyze and apply their knowledge to the world around them.

III. Specific Program Student Outcomes

A student receiving a B.S. in Biology will:

1. Have a command of basic biological knowledge.
2. Have an understanding of and the ability to use scientific methodology and technology through which biological knowledge accumulates.
3. Be able to effectively communicate and critically analyze biological knowledge.
4. Receive a comprehensive background essential to advanced work and/or a career in biology or related fields.

IV. Means of Assessing if Student Outcomes for the Program are met

1. Have a command of basic biological knowledge.

First Means of Assessment for Outcome Identified Above:

1a. Means of Program Assessment & Criteria for Success: We will administer a biology pretest to all students in General Biology 1 (Biol211) to assess their understanding of basic biological concepts (e.g. scientific method, evolution, macromolecules, etc.). Biol211 is our first major's course in our program of study. All graduating seniors will take the standardized Major Field Assessment Test (MFAT) in Biology (www.ets.org). The MFAT covers laboratory and field situations, diagrams, experimental results, and analytical skills in four major areas: cell biology; molecular biology and genetics; organismal biology; and population biology, evolution, and ecology. The cost per test is $25.00. We also will order the MFAT custom comparison report that will allow us to compare our results to those from 10 or more different institutions of our choice ($150.00). Since this is the first year to administer this standardized test, we are currently developing benchmarks for success.

Second Means of Assessment for Outcome Identified Above:

1b. Means of Program Assessment & Criteria for Success: Course grades and evaluations: Successful students will receive an average grade of "C" or better on class tests and laboratory reports in major courses. In lab reports especially the introduction and discussion sections will show evidence of integration of knowledge obtained in previous classes.

Comprehensive final exams in Biology 301 (Microbiology) and 302 (Animal Structure and Function), and a lab report or average score for Biology 423 (Molecular and Cell Biology lab portion) will be used this year.

Third Means of Assessment for Outcome Identified Above:

1c. Means of Program Assessment & Criteria for Success: Senior project-successful students will show and apply knowledge of basic biological principles to a degree that is satisfactory to the faculty of the biology discipline as indicated by a grade "B" or better.

2. Have an understanding of and the ability to use scientific methodology and technology through which biological knowledge accumulates.

First Means of Assessment for Outcome Identified Above:

2a. Means of Program Assessment & Criteria for Success: We will evaluate specific portions of the Biol211 pretest and the MFAT as a means of assessment for outcome 1 (described in 1a.). Both include sections on the use of scientific methodology.

Second Means of Assessment for Outcome Identified Above:

2b. Means of Program Assessment & Criteria for Success: Senior project- Successful completion of senior project will be indicated by "B" or higher grade.

Third Means of Assessment for Outcome Identified Above:

2c. Means of Program Assessment & Criteria for Success: Course grades and evaluations of laboratory courses; successful students will receive an average grade a "C" or better on laboratory reports and lecture or lab exams which include designing and carrying out experiments. The laboratory reports and final grades for Biology 423 (Molecular and Cell Biology) will be used as assessment tools this year.

Fourth Means of Assessment for Outcome Identified Above:

2d. Means of Program Assessment & Criteria for Success: Grades for Team Problem Sets and research paper presentation in Molecular and Cell Biology (Biol423); Successful students will receive an average grade of "C" or better on problem sets and research paper presentations.

3. Be able to effectively communicate and critically analyze biological knowledge.

First Means of Assessment for Outcome Identified Above:

3a. Means of Program Assessment & Criteria for Success: Senior Project (written and oral communication)-Successful completion of senior projects will be indicated by a "B" or higher grade.

Second Means of Assessment for Outcome Identified Above:

3b. Means of Program Assessment & Criteria for Success: Lab reports or other reports in courses - successful students will receive an average grade of "C" or better on reports presented during the courses. The score for on the research paper for Biology 423 (Molecular Cell Biology) will be used this year.

4. Receive a comprehensive background essential to advanced work and/or a career in biology or related fields.

First Means of Assessment for Outcome Identified Above:
4a. Means of Program Assessment & Criteria for Success: The student satisfaction survey will be administered to all graduating seniors in the Spring of 2008 by the Office of Institutional Research and Effectiveness. Dr. Linder modified the student satisfaction questionnaire that can be sent to students by e-mail. We will administer a modified student satisfaction survey to students who graduated in 2006 and 2007 (we have contact information for these students).

Measures of success- 50% or more of respondents indicate that they are continuing their education or employment in biology or related area. 75% of the respondents will indicate that they are satisfied or very satisfied with their preparation for work or graduate school.

V. Summary of Data Collected from the Means of Assessment

1. Have a command of basic biological knowledge.
1a. Entrance and Exit exams were not been formally administered. As a substitute, 23% (6/26) received a 70% or better on the first exam in Biol211, the first course taken by Biology majors. As a post test 50% of students received a C(3/6) or better on the final exam in Biol423 (our capstone majors course).

1b. Overall student performance in three of our upper division biology major course requirements were assessed through comprehensive final exams, final grades, and laboratory grades. For Animal Structure and Function (Biol 302) 75% (9/12) of students received a grade of "C" or better on their final exam. In General Microbiology (Biol 301), 72% (13/18), received a final grade of "C" or better for the years. 71% (5/7) students received a 70% or better in the laboratory portion of Biol423.

1c. 40% of seniors (2/5) successfully completed their senior project (Biol 492) receiving a grade of "B" or better and presenting their senior project research as part of their final grade. One student withdrew from the class and three students received incompletes that are still outstanding.

2. Have an understanding of and the ability to use scientific methodology and technology through which biological knowledge accumulates.

2a. Exit exam not given
2b. 40% of seniors (2/5) successfully completed their senior project (Biol 492) receiving a grade of "B" or better and presenting their senior project research as part of their final grade. One student withdrew from the class and three students received incompletes that are still outstanding.
2c. 71% (5/7) students received a 70% or better in the laboratory portion of Biol423. 80% (4/5) of the students received a C or better as a final grade in Biol423; two students received incompletes.
2d. 43% (3/7) of Biol423 students received a 70% or better average on the team problem sets. 100% (5/5 students received a 70% (5/5) or better on their final research paper with two incompletes.

3. Be able to effectively communicate and critically analyze biological knowledge.
   3a. 40% of seniors (2/5) successfully completed their senior project (Biol 492) receiving a grade of "B" or better and presenting their senior project research as part of their final grade. One student withdrew from the class and three students received incompletes.
   3b. 100% (5/5 students received a 70% (5/5) or better on their final research paper in Biol423 with two incompletes.

4. Receive a comprehensive background essential to advanced work and/or a career in biology or related fields.
   4a. We are waiting for results from the student satisfaction surveys.

VI. **Use of Data Results**

1. Have a command of basic biological knowledge.
   Although we were unable to do the proposed pre and post testing as indicated in our plan, we still feel it is important to develop a pretest and use a standardized test for exiting seniors. Our use of the Biol211 first exam indicates very clearly that new majors do not perform with with only 23% receiving a "C" or better. In additional only 50% of our students in our capstone course (Biol423) received a "C" or better on the final exam, less than our goal of 70% success. The performance of students in Senior Project was below our expectations. In fact our traditionally higher performing students did poorly. The department is evaluating the structure and design of the course to see if we can improve student performance. Student performance in other upper division courses (Biol301, Biol302) did meet our goal of 70% success rate.
   Retention of students declaring biology as their major is very low (we have over 70 biology majors declared but typically graduate less than 10 a year). To address this problem, we have established improved advising and mentoring strategies and have added teaching assistants to the lectures of several of our core biology courses. We also have increased our efforts of one-on-one intervention and encouraged the use of peer tutors.

2. Have an understanding of and the ability to use scientific methodology and technology through which biological knowledge accumulates.
   Although our students are meeting our goals in a number of our classes, we feel that they are still weak in the area of critical analysis and evaluation of scientific experimentation and application. There are two ways to approach this problem, we can increase exposure in classes and we can modify our teaching methods. Our program has always placed a very strong emphasis on laboratory methods and exposure to technology; all but two of our courses include a lab section. Since not all of our laboratories stress scientific methodology we may be able to increase the number of exercises that utilize this method. In addition, exposure to scientific methodology and technology in lecture courses may be increased or modified. We currently use problem sets and cases studies in Biol211, Biol212, Biol423 and in some 400-level electives. We also may incorporate the use of these methods in 300 level courses to improve on our students' performances. In terms of the low performance of our students in Senior Project, as indicated in #1, we are evaluating the structure and design of the course to see if we can improve performance. We hope to better engage the students in their culminating experience at NMHU.

3. Be able to effectively communicate and critically analyze biological knowledge.
   We continue to see improvements in the ability of students to communicate biological knowledge. Our students met our goals on the criteria 3b but not in 3a (Senior Project). To help our students

improve their ability to communicate and critically analyze biological knowledge they are encouraged to use the Writing Center and/or take Technical Writing within the English Department. Critical thinking is fundamentally tied to basic content knowledge; therefore, we have incorporated the use of more exercises in several of our biology required courses to improve the student's ability to develop this skill.

4. Receive a comprehensive background essential to advanced work and/or a career in biology or related fields.

   Although we are awaiting results from our student satisfaction survey, we are continuing to put our efforts towards improving advising and course offerings, mentioned in last year's survey. Our department hired two new faculty this past year and we have reviewed and revised our course offerings to better reflect the interests of our students. The additional faculty have also improved our ability to personally advise more students and direct independent research projects.