

**ASSESSMENT REPORT FOR BIOLOGY MAJOR-B.S.
2008 - 2009**

I. Biology Program Mission

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. (**STUDENT TRAIT – Mastery of content knowledge and skills**)
2. Have an understanding of and the ability to use scientific methodology and technology through which biological knowledge accumulates. (**STUDENT TRAIT – Effective use of technology**)
3. Be able to effectively communicate and critically analyze biological knowledge. (**STUDENT TRAITS –Effective communication skills and Critical and reflective thinking skills**)
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 and posttest to all students in General Biology 1 (Biol211). This test will include laboratory and field situations, diagrams, experimental results, and analytical skills in four major concept areas: cell biology; molecular biology and genetics; organismal biology; and population biology, evolution, and ecology. Graduating seniors will also take the MFAT test.

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 an average final grade 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.

Measures of success- 70% or more students will meet our criteria for success in all three means of assessment.

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 administer a biology pretest and posttest to all students in General Biology 1 (Biol211). This test will include laboratory and field situations, diagrams, experimental results, and analytical skills in four major concept areas: cell biology; molecular biology and genetics; organismal biology; and population biology, evolution, and ecology. Graduating seniors will also take the MFAT test.

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 laboratory portions of Biology 332 (Anatomy and Physiology 2), 432 (Vertebrate Physiology), 435 (Functional Genomics) 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.

Measures of success- 70% or more students will meet our criteria for success in all three means of assessment.

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: 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.

Measures of success- 70% or more students will meet our criteria for success in all three means of assessment.

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 2009 by the Office of Institutional Research and

Effectiveness. . A modified student satisfaction questionnaire will be administered to students who graduated in 2006 -2008 (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. This year was the first year that we gave the MFAT test, we did not do a pretest of Biol211 but in may we did administer it to 8 seniors. The mean score was 146, ranking in the **15%** of scores compared to 381 other institutions. By category: S1 Cell Biology: Ave Score 47, **15%**; S2 Molecular Biology and Genetics: Ave Score 48, **20%**, S3 Organismal Biology: Ave Score 46, **10%**; S4 Population biology, evolution, ecology: Ave Score 47, **15%**. Three Biol211/212 students took the exam and their average score was 135 placing them in the **1%** compared to 381 other institutions.

1b. Biol301 (Microbiology): Comprehensive final exam 14/16 (**87%**) with a “C” or better; Biol302 (Animal Struct & Func): Comprehensive final exam 6/11 (**54%**) with a “C” or better; Biol423 (Cell and Molecular Biol): Final Lab Grade 3/3 (**100%**). **80% overall; Meets criteria for success**

1c. Senior Project 5/8 (**62%**) received a “B” or better; 8/8 (100%) passed the class with a “C” or better. **Does not meet criteria for success**

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

2a. This year was the first year that we gave MFAT test, we did not do pretest of Biol211 but we did administer to 8 seniors The mean score of 146 was in the **15%** of scores compared to 381 other institutions. By category: S1 Cell biology Ave Score 47, **15%**; S2 Molecular Biology and Genetics Ave Score 48, **20%**, S3 Organismal Biology, Ave Score 46, **10%**; S4 Population biology, evolution, ecology, Ave Score 47, **15%**. Three Biol211/212 students took the exam and their average score was 135 placing them in the **1%** of 381 other institutions.

2b. Senior Project 5/8 (**62%**) received a “B” or better; 8/8 (100%) passed the class with a “C” or better.

2c. Biol211 (Gen Biol 211): lab grade 41/54 (**76 %**) scored “C” or better; Biology 332 (Anatomy and Physiology 2): laboratory grade 15/15 (**100%**) scored “C” or better , Biol 499 (Functional Genomics independent research): 3/5 (**60%**) scored “C” or better; Vertebrate Physiology and Functional Genomics not offered. **79% overall. Meets criteria for success**

2d. Biol423 (Molecular and Cell Biology): 3/3 (**100%**) scored “C” or better on team problem sets/presentations. **Meets criteria for success**

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

3a. Senior Project: 5/8 (**62%**) received a “B” or better; 8/8 (100%) passed the class with a “C” or better. **Does not meet criteria for success**

3b. Biol423 (Molecular and Cell Biology): 3/3 (**100%**) scored “C” or better on team problem sets/presentations. **Meets criteria for success**

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

4a. awaiting survey results; 8/9 (**89%**) of seniors are continuing education or seeking employment in biology or related area. **Meets criteria for success**

VI. Use of Data Results

1. Have command of basic biological knowledge. This was the first year to administer the MFAT test and we only had 8 seniors and 3 General Biology lower division students take the exam. Our students scored low (15%) compared to other institutions but we have no real benchmarks for success. This first year give us a measure of where are students stand on national level. This year we administered the pretest to all Biol211 and 212 students in Fall 09 and we will administer to the seniors in May 2010. This will give us a larger sample size and improve our benchmarks. In next year's plans we plan to follow a small sample of students individually as they progress from 200 to 400 level courses to see where we are losing students in the program. Our students are meeting our criteria for success on assessment 1b. However, although the performance of our Senior Project students increased from 40% to 62% receiving a "B" or better this is still below our criteria for success. The course was redesigned in Spring 2009 and faculty mentors were kept more involved in the class assignments. Grading rubrics were used for all assignments and these were given to the students at the time of assignment and shared with faculty mentors. Student evaluations indicated that the course required too much time and effort to complete research and write up project. This year we have made it a two semester course (Biol491 and Biol492).

In terms of improving advising and mentoring, we reassigned advisors to all majors and included class announcements to ensure all students meet with their faculty advisor once a semester. We have folders on all Biology majors. Peer tutors and supplemental instructors are available this year in collaboration with ARMAS for Biol211 and Biol212.

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 criteria for success in most of our courses in this area, the students performance on the MFAT and in Senior project confirms our feeling that students are weak in 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 and assessment methods. Our program places 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 have increased the number of exercises that utilize this method. We currently use problem sets and case studies in Biol211, Biol212, Biol423 and in some 400-level electives. In Biol423 we have more closely tied the techniques to the course material disease themes. With the addition of a new tenure-track faculty member, our Microbiology course has been completely redesigned. The laboratory section of Biol301 has been completely redesigned to focus more on learning the laboratory techniques and understanding concepts behind tests rather than just identifying different types of bacteria; the previous lab was more related to medical diagnostics. To improve our methods of evaluating reports and help students improve their performance we are incorporating a standard grading rubric. In terms of the low performance of our students in Senior Project, see comments in #1.

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 (see above); therefore, we have incorporated the use of more presentations and reading of primary literature into our upper division classes. Senior Projects students were all required last year to present posters at NMHU Research Day and all students were judged by a panel of reviewers.

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. Our new faculty, Drs Plunkett and Hernandez-Gifford, are in their second year and were given the opportunity to make significant changes to their courses, increasing our student's exposure to career options. Both faculty members are advising undergraduate students and taking on students in independent research and senior projects. Last year was the first formal year for our PreMed program under the guidance of Dr. Hernandez Gifford. This included an MCAT prep course and clinical shadowing experiences. This year the program is continuing and we have an active Science Club that is focusing on increasing the number of students doing summer internships and getting outside speakers to talk about career options.