

**ASSESSMENT REPORT FOR BIOLOGY MAJOR-B.S.  
2009-2010**

**I. Mission**

University: Education through Teaching, Research, and Service

The mission of the Biology program is to provide undergraduate and graduate 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 comprehensive knowledge and technological skills in the biological sciences. Our students should be able to critically analyze, communicate, and apply their knowledge and skills to the world around them. **Note:** We have developed a unit specific strategic plan to implement the University's strategic plan

**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.

For assessments using course grades the following scale will be used:

Mastered	A or B
Partially mastered	C
Approaching mastery	D
Not mastered	F

**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)** and all graduating seniors. 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.** This test will allow us to track individual performance over time.

**Second Means of Assessment for Outcome Identified Above:**

- 1b. Means of Program Assessment & Criteria for Success: Course grades and evaluations: Successful students will at least partially master with 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 mastery 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 of “B” or better.

**Fourth Means of Assessment for Outcome Identified Above:**

- 1d. Means of Program Assessment & Criteria for Success: We will use the responses to the Banner course evaluations to the question: “Overall, I would rate this course as valuable” for the following courses: Biol211, 212, 300, 301, 302, 303, 405 or 423, 491, 492. 75% of the students will agree that the course is valuable.

Measures of success- The MFAT test (1b) is more a measure of determining how our students compare to national averages. Our goal is to raise our graduating seniors performance at least 10% above last year’s performance. 75% or more students will meet our criteria for success for 1b. and 1c.

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. This test will allow us to track individual performance over time.

**Second Means of Assessment for Outcome Identified Above:**

- 2b. Means of Program Assessment & Criteria for Success: Senior project-successful students will show mastery 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 of “B” or better.

**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 at least partially master with an average grade of “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 211 (General Biol 1) 301 (Microbiology), Biol423 (Cell and Molecular 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.

Measures of success- 75% 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 students will show mastery 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 of “B” or better.

**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 at least partially master with an average grade of “C” or better on problem sets and research paper presentations.

Measures of success- 75% 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 2010 by the Office of Institutional Research and Effectiveness. A **modified student satisfaction questionnaire** will be administered to students who graduated in 2007 -2010 (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 to the Biol211 (n=41) and 212 (n=12) The mean scores was 128 and 132 for Biol211 and 212 ranking in the 1% of 459 institutions (99% of those taking the exam scored higher). The mean score for our graduating seniors (n=6) was 151, ranking in the **35%** of scores compared to 459 other institutions. By category: S1 Cell Biology: Ave Score 51, **30%**; S2 Molecular Biology and Genetics: Ave Score 52, **40%**, S3 Organismal Biology: Ave Score 46, **15%**; S4 Population biology, evolution, ecology: Ave Score 55 **60%**. For seniors, the average increase over the previous class of seniors was **20%** in mean score. **Meets criteria for success.**

**1b.** Biol301 (Microbiology): Comprehensive final exam 11/19 (**58%**) at least partially mastered with a “C” or better and of these 11, 4/19 (**21%**) mastered with an A or B; Biol302 (Animal Struct & Func): Comprehensive final exam 13/14 (**92%**) at least partially mastered with a “C” or better and of these 13, 8/14 (**57%**) mastered with an A or B; Biol423 (Cell and Molecular Biol): Final Lab Grade 7/7 (**100%**) mastered with an A or B. **83% overall; Meets criteria for success**

**1c.** Senior Project 6/7 (**86%**) received a “B” or better, 1/7 took an incomplete and is finishing in the Fall 2010. **Meets criteria for success.**

1.d. “Overall, I would rate this course as valuable” for the following courses: Biol211 (**85%**), 212 (**100%**), 300 (**91%**), 301 (**100%**), 302 (no data), 303 (**53%** but only 13% disagreed that the course was valuable), 405 (no data) or 423 (**100%**), 491 (no data), 492 (no data). **Meets 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 the MFAT test to the Biol211 (n=41) and 212 (n=12) The mean scores was 128 and 132 for Biol211 and 212 ranking in the 1% of 459 institutions (99% of those taking the exam scored higher). The mean score for our graduating seniors (n=6) was 151, ranking in the **35%** of scores compared to 459 other institutions. By category: S1 Cell Biology: Ave Score 51, **30%**; S2 Molecular Biology and Genetics: Ave Score 52, **40%**, S3 Organismal Biology: Ave Score 46, **15%**; S4 Population biology, evolution, ecology: Ave Score 55 **60%**. For seniors, the average increase over the previous class of seniors was **20%** in mean score. **Meets criteria for success.**

2b. Senior Project 6/7 (**86%**) received a “B” or better, 1/7 took an incomplete and is finishing in the Fall 2010; **Meets criteria for success.**

2c. The laboratory reports and final grades for laboratory portions: for Biology 211 (General Biol 1) 44/61 (**72%**) at least partially mastered with a C or better and of these **75%** mastered with an A or B.; for 301 (Microbiology) 16/19 (**84%**) at least partially mastered with a “C” or better, of these 16, 12 (**63%**) mastered with a grade of A or B. , Biol423 (Cell and Molecular Biology) Final Lab Grade 7/7 (**100%**) mastered with an A or B. **Overall 77%, meets criteria for success.**

2d. Molecular and Cell Biology (Biol423): Average grades for Team Problem Sets was **47%**; for the research paper presentation **100%** at least partially mastered with C or better and 6/7 (**86%**) mastered with and A or B. **Does not meet criteria for success.**

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

3a. Senior Project 6/7 (**86%**) received a “B” or better, 1/7 took an incomplete and is finishing in the Fall 2010; **Meets criteria for success.**

3b. Molecular and Cell Biology (Biol423): Average grades for Team Problem Sets was **47%**; for the research paper presentation **100%** at least partially mastered with C or better and 6/7 (**86%**) mastered with and A or B. **Does not meet criteria for success.**

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

4a. Student satisfaction survey indicates that 6/6 (**100%**) of graduates were satisfied or very satisfied with their preparation for graduate school/work. Of our graduating seniors, (3/7 are in graduate NMHU Life Science graduate program, 1/7 is working in biology career, 3/7 are to continue their education in biology or a related area. **100%, meet criteria for success.**

VI. Use of Data Results

1. Have command of basic biological knowledge.

- a. The MFAT test is not appropriate for incoming freshman as evidenced by 1% rating and the testing agency indicated that it is for graduating seniors. We need to make up our own initial assessment exam or find an alternative standardized test for freshman. Our graduating seniors did improve about 20% over the seniors from the previous year.
- b. Overall we met criteria for success although comprehensive exam performance in Microbiology (Biol301) was lower than the previous year and Animal Structure and Function (Biol302) performance was higher than the previous year. In Biol301, 3/19 did not take the final exam

which may account for the lower results. Also, Microbiology was redesigned significantly to increase analysis of data and understand larger concepts which our students have difficulty doing.

- c. Senior project was redesigned and split into a two semester course with increased mentoring. This was successful as indicated by an increase in student performance and we did meet criteria for success. Unfortunately, the numbers of students enrolled are low and we agree that recruitment and retention efforts need to be increased to increase our number of graduating seniors.
- d. We met criteria for success. In Biol303, we had a number of students that were neutral (neither agree or disagree). In the future we will look at both students that agree and disagree with the statement on the course evaluation “overall, I would rate this course as valuable.”

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

- a. The MFAT test is not appropriate for incoming freshman as evidenced by 1% rating and the testing agency indicated that it is for graduating seniors. We need to make up our own initial assessment exam or find an alternative standardized test for freshman. Our graduating seniors did improve about 20% over the seniors from the previous year.
- b. Senior project was redesigned and split into a two semester course with increased mentoring. This was successful as indicated by an increase in student performance and we did meet criteria for success. Unfortunately, the numbers of students enrolled are low and we agree that recruitment and retention efforts need to be increased to increase our number of graduating seniors.
- c. Lab grades overall are good which may be a result of the increased emphasis on laboratory exercises and scientific methodology in our core courses.
- d. Student performance on team problem sets in Biol423 grade was lower than expected. This supports our feeling by the majority of the faculty that our students have difficulty critically analyzing data and applying what they know to real-world problems. Although we are meeting overall criteria, emphasis on critical thinking skills will be increased in lower division major's classes.

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

- a. Senior project was redesigned and split into a two semester course with increased mentoring. This was successful as indicated by an increase in student performance and we did meet criteria for success. Unfortunately, the numbers of students enrolled are low and we agree that recruitment and retention efforts need to be increased to increase our number of graduating seniors.
- b. Student performance on team problem sets in Biol423 grade was lower than expected. This supports our feeling by the majority of the faculty that our students have difficulty critically analyzing data and applying what they know to real-world problems. Although we are meeting overall criteria, emphasis on critical thinking skills will be increased in lower division major's classes.

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

- a. We met criteria for success. Although the number of graduating seniors is lower than we would like, our graduates are very satisfied with the educational experience received and are finding employment or continuing studies in biology related areas. We continue to bring in outside speakers to talk about career options, use facebook , Science Club, and advising to let students know about summer internships. ARMAS in Education also offers a great deal of support.