BIOLOGY DEPARTMENT ASSESSMENT PLAN

Department Mission Statement

Biology is the study of the organization and operation of life at cellular, organism, and population levels. An understanding of biology leads to an appreciation of the complexity of the world of life and the role that human beings have within it. The department offers both Bachelor of Science and Bachelor of Arts degree programs. In addition, the department serves the needs of a large number of students from other departments and pre-professional programs. Students who concentrate in biology can design their programs to be the focus of a broad and liberal education, to prepare for graduate studies or to become certified as a secondary education biology teacher.

The mission of the Biology Department is to provide students with a broad knowledge base in biology and the skills necessary to be successful in attaining their chosen career goals. In addition to the factual content, students learn the historical basis, the social context, and the scientific methodology of each of the major conceptual areas of biology.

Bachelor of Science Programs

Program in General Biology

Program Mission Statement

The mission of the Bachelor of Science Program is to provide resources so students can prepare for entry level employment or graduate and professional training in a variety of sub-disciplines of biology. Toward this end, the general biology program is designed to provide a broad preparation in biology along with the greatest degree of student choice in selecting upper-level courses. Like all of the Bachelor of Science programs in biology, this program requires a foundational set of five, core-biology courses. The five core biology courses in the Bachelor of Science are Organismal Biology (BIO 111); Principles of Biology (BIO 113), Cell Biology (BIO 326), Ecology (BIO 327), and Genetics (BIO 328). Aside from the core biology courses, students, with the aid of an advisor, may select from a wide range of biology courses to meet their own individual interests and career goals.

Objectives

Students completing the Bachelor of Science program will demonstrate: 1) a broad training in biology; 2) mastery of skills common to laboratory and field biology; and 3) a foundation in the fundamentals of scientific inquiry, critical analysis of data, and communication of results.

Program in Molecular Biology and Biotechnology

Program Mission Statement

The mission of this program is to provide students with a solid foundation in molecular biology, allowing students to acquire basic skills necessary to compete for employment and/or positions in graduate programs related to molecular biology. The specialty courses in biology required for this program are Immunology (BIO 425), Microbiology (BIO 435), Molecular Biology of Procaryotes (BIO467) and Molecular Biology of Eucaryotes (BIO468). In addition, the Organic Chemistry with Laboratory sequence (CHM 203, 231, 232, 233) and the Biochemistry lecture sequence (CHM 450, 452) are required for this program. While this program provides a significant level of specialization, students completing this program will still be broadly trained in biology, having completed the five biology core courses and all other requirements of the program in general biology (Bachelor of Science). Students in this specialty B.S. program will be exposed not only to factual and historical information, but will also be introduced to modern molecular biological methodology and will be expected to develop critical thinking and data analysis skills, especially as they apply to molecular biology and biotechnology.

Objectives

Students completing the molecular biology and biotechnology program will demonstrate: 1) a broad training in biology; 2) mastery of skills common to laboratory and field biology; and 3) a foundation in the fundamentals of scientific inquiry, critical analysis of data, and communication of results; 4) preparation for graduate training or entry-level employment in the molecular biology/biotechnology fields.

Program in Wildlife Biology

Program Mission Statement

The program in wildlife biology is designed to provide students with a rigorous curriculum in preparation for careers in this exciting and expanding area of biology. Students in this program will be exposed to wildlife management methods, field techniques and theoretical studies of wildlife populations and species. The specialty courses required for this program include a biology course in wildlife management in addition to the following courses: Environmental Chemistry (CHM 380) Physical Geography (GEO 151), Introduction to Spatial Analysis (GEO 203), Resource Planning and Management (RPL 312), Geographic Information Systems (RPL 370). While this program provides a significant level of specialization, students completing this program will still be broadly trained in biology, having completed the five biology core courses and all other requirements of program in general biology (Bachelor of Science). Students completing this program will be competitively qualified for entry-level positions with state and federal agencies, private companies, and for the pursuit of higher academic degrees.

Objectives

Students completing the wildlife biology program will demonstrate: 1) a broad training in biology; 2) mastery of skills common to laboratory and field biology; and 3) a foundation in the fundamentals of scientific inquiry, critical analysis of data, and communication of results; 4) preparation for graduate training or entry-level employment in the wildlife biology fields.

Teacher's Certificate Program in Biology

Program Mission Statement

The mission of the Teacher's Certificate Program Bachelor of Science in Biology is to provide students with a strong preparation in biology and other sciences and math to equip them as effective teachers at the secondary school level. To this end, after completion of the five core courses common to all Bachelor of Science programs in biology, students are required to prepare broadly (rather than specialize, for instance in human biology) by completing at least one course in each of the following areas: 1) Genetics Laboratory; 2) Botany; 3) Zoology; 4) Field Biology; 5) Advanced Cell Biology; and 6) Human-oriented Biology. Other than this breadth requirement, the Biology Department's graduation requirements of the Bachelor of Science/Teacher's Certificate Program in Biology are identical to that of the Bachelor of Science Program in Biology. In addition, students must complete Education Department's requirements for teacher certification (see catalog).

Objectives

Students completing the Bachelor of Science/Teacher's Certificate Program in Biology will demonstrate: 1) a broad training in biology; 2) mastery of skills common to laboratory and field biology; and 3) a foundation in the fundamentals of scientific inquiry, critical analysis of data, and communication of results.

Bachelor of Arts Programs

Program in Human Biology

Program Mission Statement

The Bachelor of Arts program in human biology is designed to provide students with a background in human-related biology courses as the focus of a broad and liberal education and in preparation for entrance into physical therapy, physician assistant, or pathology assistant programs. Before selecting this program students are cautioned to carefully consider their educational goals *and to review the requirements for their future health professional program. It is strongly advised that students considering the program in human biology seek the counsel of a faculty advisor during their first year as critical decisions concerning the election of a chemistry sequence must be made at this time*. General Biology program students are required to take the two-semester freshman chemistry sequence (CHM 160/161-162/163), while human biology program students may alternatively choose a one-semester chemistry survey course (CHM 150/151). Students who choose CHM 150/151 and then later decide to switch to the General Biology program may not be able to complete their degree within four years.

The program in human biology is not designed for students planning professional or graduate studies in the medical or biological sciences. Such students should complete one of the Bachelor of Science degree programs. The principle differences between the human biology program and any of the Bachelor of Science programs are that Bachelor of Science programs require more math and chemistry courses, while the human biology program requires a course in public speaking and selection of the foreign language area option for general education and a different set of core-biology courses.

Objectives

Students completing the program human biology will demonstrate: 1) a strong foundation in health care related biological sciences; 2) a foundation in the fundamentals of scientific inquiry, critical analysis of data, and communication of results.

Program in Natural History

Program Mission Statement

The program in natural history is designed for students with a naturalist's interest in biology. Potential careers exist as naturalists with parks, nature centers or organizations such as the Nature Conservancy and the Sierra Club. Generally, this program is not intended for students planning graduate studies in the life sciences. There are three core biology courses in this program, Organismal Biology (BIO 111); Principles of Biology (BIO 113) and Ecology (BIO 327). The program requires a semester each of college algebra (MTH 111 or equivalent), statistics (BIO 301 recommended), chemistry with laboratory (CHM 140 & 131 or equivalent/higher level courses) and physics with laboratory (PHY 143 or equivalent). To provide students in this program with enhanced communication skills, the program also requires two communication courses: Introduction to Public Speaking (COM 210) and Principles of News and Feature Writing (COM 225). Advanced biology course requirements for this program are a minimum of five additional 400 level courses in field or organismal biology that list Ecology (BIO 327) as a prerequisite. The mission of this program is to provide students with a program of naturalist-oriented courses in biology, as the focus of a broad and liberal education.

Objectives

Students completing the program in natural history will demonstrate: 1) a broad training in field and organismal biology; 2) a foundation in the fundamentals of scientific inquiry, critical analysis of data, and communication of results.

Assessment of Programs

Assessment Tool Common to All Biology Programs:

Survey of Recent Graduates: The Biology Department has used graduate surveys since 1984 (see Appendix I for current survey form). The version of the survey conducted in 1997 collected data on graduates from 1994 and 1995 (see survey results on the Biology Web Page). The departmental philosophy on graduate surveys is that they should be completed by students two to four years after graduation. This allows time for students to begin post-graduate studies or find employment, making their responses more relevant than if surveyed immediately after graduation. New groups of students will be surveyed every three years. The survey serves as an assessment tool to determine: 1) how successful graduates were in attaining their career goals; 2) whether graduates perceive themselves as broadly trained in biology; and 3) how they would compare their overall biology training to that of their present peer group.

Assessment Tool Unique to the Bachelor of Arts Program in Biology:

Oral Examination: Bachelor of Arts students (3-5 students/year) will be required to take an oral examination composed of questions based on material covered in foundation and upper level biology courses (BIO 111, 113, 327, 4XX) taken by the student. The departmental secretary will maintain a computer file of potential exam questions and answers submitted by the faculty who teach B.A. program courses. The examination will be administered by an ad hoc committee of at least two faculty appointed by the departmental chair. This examination will serve as an assessment tool for breadth of training in field and organismal biology, critical thinking and oral communication ability. Individual student performance on this examination will be used to guide course selection by that student in their senior year.

Assessment Tool Common to the Bachelor of Science Programs in Biology:

Mastery Learning Skills: Mastery learning skills will comprise a set of key examination questions or class assignments identified for courses in the core curriculum. Performance and knowledge objectives related to these learning objectives will be evaluated for courses in the core curriculum and added to a database each time the course is taught. This evaluation will serve as an assessment tool for the mastery of skills common to laboratory and field biology, including communication of results.

Assessment Tool Specific to the Bachelor of Science/ Teaching Certificate Program in Biology:

Standardized Test: Graduates of the Teacher's Certificate Program in Biology generally take the Michigan Test for Teacher Certification in Biology prior to employment. This test will serve as an assessment tool for both breadth of training in biology in addition to that provided by the survey of recent graduates. The test also will provide assessment of critical thinking.

Goals

Goals for all biology programs are similar. The goals for student success in obtaining career goals that utilize their biology training will be met if 75% or more students indicate that they have had such success.

Breadth of training goals for the graduate survey will be met if 75% or more of students perceive themselves as broadly trained in biology.

Breadth of training goals for standardized tests given to students in the Bachelor of Science/Teacher's Certificate Program in Biology will be met with scores at the 50th percentile or better in all test categories by 75% of students.

Goals for the oral examination given to students in the Bachelor of Arts Program in Biology are a cumulative score of 75% or better: 1) Correct responses to questions presented (75% of score) and 2) effective oral communication (25% of score) in front of a group (examination committee). Factors used to judge effective oral communication will comprise: 1) ability to remain calm and composed during the examination; 2) answers that are well thought out and presented in a logical sequence; and 3) the use of grammatically correct English.

Goals for student performance on Mastery Learning Skills will be met if, for each evaluated core curriculum course, if the success rate for each Mastery Learning Skill is 75% or better.

Feedback

Program assessment issues will be discussed at regular departmental faculty meetings. The department as a whole, or a designated ad hoc faculty committee, will evaluate the outcomes of the preceding assessment procedures periodically and will make appropriate changes to program curricula.

Budget

In recent years, the numbers of students graduating in each of the biology programs were as follows:

Bachelor of Arts Program:	3 – 5 students (ave. 4)
Bachelor of Science Program:	37 – 41 students (ave. 39)
Bachelor of Science/Teaching Certificate Program:	5 – 8 students (ave. 6)

	# of students	each	Unit cost	subtotals
Graduate Survey Materials:				
Photocopying of survey material and cover letter:	49	6	$0.04	$11.76
Envelopes (preprinted)	49	1	$0.12	$5.88
Outgoing postage	49	1	$0.38	$18.62
Return postage at 50% return rate	25	1	$0.44	$11.00
Standardized Tests:				
Teacher's Certification Test (paid for by students)	6	1	$0.00	$0.00
Oral Exam (BA students only)	4	1	$0.00	$0.00
Total:				$47.26

Budget items are presented as yearly costs; however, graduate survey costs would occur every third year (at three times the amounts shown for survey materials).

Biology UG Assessment Plan Appendix I, Graduate Survey 05/17/01

On this side of this form, you are requested to assess the entire group of BIO courses you took at UMF as a portion of a degree, pre-professional, or other course grouping offered by BIO at UMF. The practical objective of BIO programs is to create a broadly educated and highly competitive product (you). In view of that objective:

1. Did you attempt to obtain a vocational or continuing education position related to your BIO training?

_____yes_____no If yes, please identify the position(s) _____

_____

2. Did you obtain the position/s referred to in 1? _____yes _____no Please comment_____

_____

3. The **BIO core courses** are intended to provide **breadth** of BIO coverage. Do you consider yourself to be broadly trained in BIO? _____yes_____no Comment on core courses _____

_____

4. Did **all your BIO courses** at UMF help you to be marketable and competitive? _____yes _____no

Comments, please _____

_____

5. Compare your **overall BIO training** at UMF to that of your present peer group?

Much better _____ Better _____ About the same _____ Worse _____ Much Worse _____

Please comment _____

_____

6. What did BIO at UMF do well? Comment, please. _____

_____

7. What did BIO at UMF do poorly? Comment, please. _____

_____

8. Please comment on any other characteristics of BIO at UMF that you think may help us assess and improve our overall programs. _____

_____

_____

9. BIO at UMF now has a Masters program (for more info. See: www.flint.umich.edu/Departments/Biology)
Do you have any interest in such a program? ___yes ___maybe ___no

Circle your graduation year 1998, 1999, 2000, 2001, _____

Check the program under which you graduated:

_____ B.A., Human Biology _____ B.S., General Biology _____ B.S., TCP

_____ B.A., Natural History _____ B.S., Molecular Bio./Biotech _____ B.S., Wildlife Biology