

Program
BA in Biology
BS in Biology

Department
Biological Sciences

College
Arts and Sciences
Year
2014

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Faculty Committee:

TBD

I. Program Overview

The BS and BA programs in Biological Sciences combine a broad foundation in Biological Sciences during the first two years of the program with an opportunity to specialize in an area of biology in alignment with a student's specific goals during the final two years of the degree program. Within the Biology programs are concentrations in Animal, Biomedical, Cell and Molecular and General Biology. So this program can provide opportunities for students interested in such disparate fields as conservation biology, genetic counseling and biotechnology as well as a strong background for admission to professional schools with programs in medicine, pharmacy and environmental law.

Students electing one of the concentrations take the same introductory courses but their five upper division biology courses are taken in their concentration area. For example, a student in the animal concentration might take Vertebrate Zoology, Aquatic Biology, Invertebrate Zoology, Animal Behavior, and Conservation Biology for their five upper division courses. A Biomedical concentration might consist of Microbiology, Human and Comparative Anatomy, Medical Botany, Comparative Endocrinology, Immunology and Human Physiology and Biomechanics. In contrast, a student interested in Cell and Molecular Biology could take Biotechnology Lab Methods, Human Genetics, DNA Forensics, Molecular Biology of Prokaryotes and Bioinformatics for their five courses. Finally, a student in the Ecology and Evolution concentration could take Environmental Field Studies, Botany, Invertebrate Zoology, Evolutionary Biology and Advanced Ecology.

Note: The differences between the BA and the BS program in Biological Sciences pertain to courses not in the Biological Sciences Department. The BA program does not require Physics or Calculus. Since this assessment is confined to the courses housed in Biological Sciences the BA and BS programs should be assessed together.

Program Outcomes

Please include in this section your program learning outcomes as they are listed in the P-1 form in eCurriculum. If you are already planning to revise those program learning outcomes, indicate in this section which ones might be changed, and what the new program learning outcomes are likely to be. In general, learning outcomes should be measurable, assessable, or observable in some way and aligned with national standards.

BS in Biological Sciences

Current 12 Learning Outcomes

- 1) Describe how scientific methods are used to identify, ask, and answer questions about life processes
- 2) Discuss how biological knowledge changes through time and examine the interrelations among biology, other scientific disciplines, and society.
- 3) Know how to design and carry out biological experiments in laboratory and field settings.
- 4) Know how to collect, organize, analyze, and interpret quantitative and qualitative data.
- 5) Apply knowledge of appropriate safety protocols and standards of responsible conduct of research.
- 6) Communicate biological knowledge formally and informally in oral, written, and poster presentation format.
- 7) Read, understand, and critically review various types of scientific information including primary research articles, mass media sources and world-wide web information.
- 8) Identify the basic structures and fundamental processes of life at all levels of biological organization, and describe the interrelationships among these levels
- 9) Understand the molecular and cellular mechanisms underlying normal development and disease.
- 10) Examine how genetic, developmental, and evolutionary processes lead to adaptation and biological diversity.
- 11) Analyze the relationships between life forms and their environment and ecosystems
- 12) Design inquiry-based capstone projects, interpret data, and communicate this knowledge formally and informally in oral, written, and/or poster format.

Revised Program Outcomes on following page

Biological Sciences graduates will have the ability to use their knowledge of math, chemistry, physics and biology principles to:

- 1) Explain our current understanding of the fundamental structural, physiological, molecular and cellular mechanisms of life and analyze how alterations in those mechanisms result in normal development and disease.
- 2) Explain our current understanding of the mechanisms that result in evolution and adaptation of organisms to their environment and the development of ecosystems and predict how changes in the environment and the abundance of organisms will affect ecosystems
- 3) Plan and carry out biological experiments safely and responsibly in laboratories and/or the field.
- 4) Research and critically analyze biological scientific information and evaluate how scientific information changes with time and influences society.
- 5) Communicate accurate scientific biological information to biology professionals and the general public in visual, written and oral forms.

II. Curriculum/Program Map

Please include in this section a grid that identifies connections that exist between required courses in this program and the corresponding program-level learning outcomes. In other words: how will program outcomes be met? This grid should further indicate the expected levels of learning at each level (whether emerging, strengthening, or achieved). The CET&L web site includes templates that you might find useful in completed this grid.

See following page

Key							
E: Emerging D: Developing A: Achieved							
OUTCOMES							
	BIOL1081 & BIOL1081L	BIOL1082 & BIOL1082L	BIOL 1081C	BIOL 2082C	BIOL 3000 -6000 C or L	BIOL 3000 -6000	BIOL 5050 Capstone
1 Basic Molecular and Cellular Mechanisms	E		D			D	A
2 Basic Adaptation and Ecosystem Principles		E		D		D	A
3 Principles of Biological Experimentation	E	E	D	D	D, A	D	A
4 Research and Analyze Biological Information	E	E	D	D		D	A
5 Communicate Biological Information	E	E	D	D		D	A
6							
7							
9							

* Please note that you are only identifying required courses and experiences that are house with in your academic unit.

III. Methods and Measures

Please include in this section a description of the assessment methods that your program plans to use in assessing each of its program learning outcomes. These methods ideally include both direct and indirect examples of student learning, with authentic, performance-based assessment performed at all levels. You may find it helpful to include the "Assessment Measures Alignment Matrix" from Activity 5.

The introductory first year courses BIOL1081, 1081L, 1082 and 1082L are taken by all biology majors and designed to introduce students to biology. These are large courses with standard finals and assignments that can be used for assessment at the emerging level. The second year biology courses BIOL2081C, and 2082C are taken by all biology majors and designed to emphasize how the basic principles of biology are used to solve biological problems. Again, these are large courses with standard finals and assignments that can be used for assessment at the level of development. During the third and fourth years students take five upper division courses that fit their specific goals and cover the breadth of biology (see list below) that develop their biological knowledge and analysis and communication skills. A standard assessment is difficult in these disparate courses so assignments unique to each course would need to be used to assess these courses. However, every biology student takes at least one formal laboratory course (designated BIOL3000-6000C or L) so outcome 3. Principles of Biological Experimentation can be assessed by lab reports and or lab practicals in these laboratory courses. Finally, every student completes a capstone project that includes a written and oral presentation of biological information so achievement of the four remaining outcomes 1. Basic Molecular and Cellular Mechanisms, 2. Basic Adaptation and Ecosystem Principles, 4. Research and Analyze Biological Information 5. Communicate Biological Information can be assessed using the capstone project.

Current Upper Division Biology Courses Taught FS 2012-SS2014

Course #	Course Title
3010C	Botany
3011C	Env. Field Techniques
3020C	Human / Comp. Anatomy
3021	Human / Comp. Physiology
3024/3024L	Aquatic Biology
3030	Human Genetics
3051C	Flow. Plant Classification
3052	Medical Botany
3075L	DNA Sequence Analysis
3077	DNA Forensics
4011/4011L	Microbiology

4020C	Invertebrate Zoology
4022C	Vertebrate Zoology
4023	Conservation Biology
4025C	Plant Physiology
4030	Animal Behavior
4040	Neurobiology
4041	Sensory Physiology
4043	Medical Parasitology
4052C	Plant Ecology
4061	Mol. Genetics of Eukaryotes
4062	Mol. Biol. of Prokaryotes
4091C	Biotechnology Lab Methods
6004	Behavioral Genetics
6042	Toxicology
6051	Comparative Endocrinology
6077	Evolutionary Biology
6080	Immunology
6081	Imm. Defense and Disease#
6091C	Advanced Ecology
6093C	Human Phys and Biomech.

Assessment Measures Aligned with Program Outcomes

Program Outcome	Assessment Tools Responsible Person, Course(s) and Time frame	Course/ Experience	Time Line	Responsible Person
1. Basic Molecular and Cellular Mechanisms	A standard set of questions on the final will be used to assess the E and D stages, The capstone project will be used to assess the A stage	BIOL 1081(E), Biol2081C(D), BIOL 3000-6000 courses designated	Data collected every semester, Annual summary to inform changes for upcoming academic year, major changes every 4-5 years	Undergraduate Studies Committee in consultation with the Department Head
2 Basic Adaptation and Ecosystem Principles	A standard set of questions on the final will be used to assess the E and D stages, The capstone project will be used to assess the A stage	BIOL 1081(E), Biol2081C(D), BIOL 3000-6000 courses	Data collected every semester, Annual summary to inform changes for upcoming academic year, major changes every 4-5 years	Undergraduate Studies Committee in consultation with the Department Head
3 Principles of Biological experimentation	A lab report or practical unique to each course will be used to assess the E, D and A stages	BIOL1081 &1082 (E) BIOL2081C &2082C (D) 3000-6000 COURSES (A)	Data collected every semester, Annual summary to inform changes for upcoming academic year, major changes every 4-5 years	Undergraduate Studies Committee in consultation with the Department Head
4 Research and Analyze Biological Information	A standard assignment unique to each course will be given to assess the E, D stages , the capstone project will be used to assess the A stage	BIOL1081L &1082L (E) BIOL2081C &2082C (D) 3000-6000L&C COURSES(A)	Data collected every semester, Annual summary to inform changes for upcoming academic year, major changes every 4-5 years	Undergraduate Studies Committee in consultation with the Department Head
5 Communicate Biological Information	A standard assignment unique to each course will be given to assess the E, D stages ,the capstone project will be used to assess the A stage	BIOL1081 &1082 (E) BIOL2081C &2082C (D) 3000-6000 COURSES (D,A) CAPSTONE (A)	Data collected every semester, Annual summary to inform changes for upcoming academic year, major changes every 4-5 years	Undergraduate Studies Committee in consultation with the Department Head

IV. Assessment Infrastructure

Please include in this section a description of the process by which your program intends to assess its learning outcomes.

- Describe which program faculty will be charged with overseeing the execution of the assessment plan as well as the ways in which they will carry out that charge, including a description of the planned timeline for assessment.*
- Identify what kinds of administrative support will be available for those faculty*

Please note that assessment plans should be capable of producing reports annually based on their review of the relevant data from their programs. The work of your faculty might also be coordinated and aligned with similar assessment efforts at the college and institutional levels.

Faculty teaching courses and overseeing capstone projects will be charged with collection and evaluation of assessment assignments. Emphasis will be on collecting assessments that all students complete (the first and second year biology courses and the capstone, see chart above). These will be forwarded to the Undergraduate Studies committee at the end of each semester and assessed in consultation with the Department Head annually. The large number of biology majors (approximately 150 students applied for graduation spring semester 2014) will require careful planning for efficient collection and assessment of assignments. At this point there are no resources available to carry out this assessment plan.

This plan does not include exit interviews because the resources necessary for exit interviews with more than 150 students per year are not available. Another valuable addition to this plan, if resources were available, might be an assessment of undergraduate student research including students presenting at conferences and publications including undergraduate students. However, many capstone projects include undergraduate research so by using capstones as assessments we will get some information on undergraduate research.

IV. Findings

Here you will describe and explain in this section any multi-year patterns and trends that your assessment efforts have identified, including a description of any relevant relationships to national standards.

We have not yet begun collecting data for our assessments.

V. Use of Findings

In this final section, you will describe how your program intends to make use of the program-level assessment data it has gathered.

- How will this information be presented to and discussed among the faculty?*
- How might this data or these discussions result in review and possible revision of course or program learning outcomes and pedagogical strategies?*

The Undergraduate Studies Committee in consultation with the Department Head will present the assessment to the faculty as a whole for discussion and review. The review will identify successes and challenges that could prompt changes in individual courses or the program as a whole.