Revised Biology Department Assessment Plan – January 10, 2014

I. Department Student Learning Statement

The Biology Department is committed to providing intellectually rich and challenging learning experiences for majors and non-majors alike. These experiences are intended to communicate the foundations and frontiers of the life sciences (from molecules to ecosystems), the methods of biological inquiry, and the relevance of biology to society.

II. Department Learning Goals and Outcomes

Learning Goals

1. understand that science is a continual and dynamic process of investigation.

2. appreciate that biological knowledge progresses via the scientific community's ongoing support and rejection of competing hypotheses. Toward this end, all of our students should become familiar with the historical development of some of the major concepts in biology.

3. understand that these decisions to support or reject hypotheses are based on empirical evidence and logical arguments developed through inductive and deductive reasoning.

4. learn how to engage in scientific inquiry through the appropriate application of laboratory, field, modeling, statistical, and/or mathematical methods.

5. understand core concepts that currently define and guide biology, specifically: evolution; structure and function; information flow, exchange, and storage; pathways and transformation of energy and matter; and, systems.

Learning Outcomes

1. be able to apply the process of science by being able to:

    a. demonstrate an understanding of current theories and knowledge of biology,
    b. recognize and identify biological morphologies and processes,
    c. review and critique primary biological literature,
    d. articulate testable hypotheses,
    e. design effective investigative approaches,
    f. collect data using appropriate research methods,
    g. analyze, interpret, and visually represent data,
    h. write in various scientific formats, e.g., research paper, research proposal, critical review article.

2. be able to use quantitative reasoning to analyze and interpret data, including the use of statistics, data visualization, and other computational techniques.

3. be able to use modeling and simulation in order to understand and examine complexity in biological systems.

4. be able to adopt an interdisciplinary approach in order to understand and interpret biological phenomena by applying concepts and subdisciplinary knowledge from within and outside of biology.

5. be able to communicate orally and in writing, and to collaborate within the discipline and with other disciplines.

6. be able to articulate the relationship between science and society.

III. Department Assessment Strategies

We will use six different assessment tools to assess the specified learning outcomes of students majoring in biology:

CP (Capstone Paper): This is the first part of our students' capstone project. Working under the supervision of a faculty or teaching staff member, students write a multiple draft paper (either a scientific research paper or critical literature review). The paper is assessed by the faculty supervisor, with other students and the faculty supervisor providing feedback on the drafts.

COP (Capstone Oral Presentation): This is the second part of our students' capstone project. At the end of the semester, each student presents a fifteen minute oral presentation (mini-seminar) on their topic to an audience consisting of faculty members and other students. The oral presentation is assessed by the faculty members, teaching staff members, and students attending the presentation.

FT (Field Test): This is a standardized exam developed by the Educational Testing Service to test knowledge and quantitative and analytical skills and represents an objective assessment of knowledge and skills.

ES (Exit Survey): This is a survey administered to all graduating bio majors and represents a self-assessment by the student.

AS (Alumni Survey): This is a survey administered to bio alumni who graduated five to eight years earlier and represents a self-assessment by the alumni.

ILA (Integrated Learning Analysis): This is an analysis that will be conducted annually for each of our majors based on the variety of biology learning experiences in which the student has participated (including courses, labs, experiential learning, and independent research projects), and the specific learning outcomes emphasized by each experience.

The ILA will yield a report (the Integrated Learning Analysis Report, ILAR) for each student consisting of a list of all the student's learning experiences to date and the learning outcomes associated with each experience. The report will be updated during advising sessions using a template. Besides being used to assess the progress being made by our majors toward the learning outcomes, the ILAR will also be used by advisers to identify learning experiences a student should pursue in order to achieve all the learning outcomes.

The senior Exit Survey and the Alumni Survey will be used to provide student self-assessments of all the learning outcomes. The learning outcomes to be assessed using the Capstone Paper (CP), Capstone Oral Presentation (COP), Field Test (FT), and Integrated Learning Analysis (ILA) are indicated below.

1. be able to apply the process of science by being able to:

    a. demonstrate an understanding of current theories and knowledge of biology (FT, ILA)
    b. recognize and identify biological morphologies and processes (FT, ILA)
    c. review and critique primary biological literature (CP, ILA)
    d. articulate testable hypotheses (ILA)
    e. design effective investigative approaches (ILA)
    f. collect data using appropriate research methods (ILA)
    g. analyze, interpret, and represent data (ILA)
    h. write in various scientific formats, e.g., scientific research paper, research proposal, critical review article. (CP, ILA)

2. be able to use quantitative reasoning to analyze and interpret data, including the use of statistics, data visualization, and other computational techniques (FT, ILA)

3. be able to use modelling and simulation in order to understand and examine complexity in biological systems (ILA)

4. be able to adopt an interdisciplinary approach in order to understand and interpret biological phenomena by applying concepts and subdisciplinary knowledge from within and outside of biology (ILA)

5. be able to communicate orally and in writing, and to collaborate within the discipline and with other disciplines (CP, COP, ILA).

6. be able to articulate the relationship between science and society (ILA)

IV. Four-Year Timeline to Implement Assessment Strategies

2014: Field Test, Capstone Paper, Capstone Oral Presentation, Integrated Course Analysis, Senior Exit Survey

2015: Alumni Survey, Capstone Paper, Capstone Oral Presentation, Integrated Course Analysis, Senior Exit Survey

2016: Capstone Paper, Capstone Oral Presentation, Integrated Course Analysis, Senior Exit Survey

2017: Capstone Paper, Capstone Oral Presentation, Integrated Course Analysis, Senior Exit Survey