Zoology
Assessment Report
(2006-2009)

PROGRAM ASSESSMENT REPORT
UNDERGRADUATE MAJOR IN ZOOLOGY

Proposed Standing Evaluation Process
2006-2009

1. PROGRAM OVERVIEW & GOALS

The Department of Zoology at the University of Wisconsin – Madison seeks to provide a liberal arts environment within the College of Letters and Science in which undergraduates may choose to study a wide range of topics in the biological sciences.

Majors: ~320 # degrees conferred annually: ~140

Goals for a Zoology Major:

The Zoology major should have a capacity for critical thinking and conceptual skills that allow understanding of biological complexity and the interrelationship of humans and natural systems. Students should appreciate the diversity of life, having a basic understanding of genetic, cellular, physiological, ecological and evolutionary principles and a solid foundation in related disciplines of chemistry, physics, and mathematics. Students should understand how scientific information is obtained and evaluated and understand its application to societal issues.

Unique Characteristics of the Zoology Major:

- broad, integrated training in biology
- focus on basic principles and processes of biology
- flexibility to tailor major, with advising, to the individual's goals
- wide range of opportunities for senior thesis and other independent projects

Expected Student Outcomes:

Resulting from the completion of an undergraduate major in zoology, student outcomes are expected to include the following knowledge, skills, and values:

Students…

1. Understand principles of genetics
2. Understand principles of cellular biology
3. Understand principles of physiology
4. Understand principles of ecology
5. Understand principles of evolution
6. Understand current issues in biology
7. Solid foundation in related disciplines of chemistry, physics, and mathematics
8. Understand how scientific information is obtained
9. Understand biological complexity
10. Understand the interrelationship of humans and natural systems
11. Develop quantitative reasoning skills (ability to solve problems requiring math/stat reasoning)
12. Develop critical thinking skills (ability to ID problem, ID info needed to solve problem, develop methods for solving)
13. Develop skills to effectively communicate scientific information through written reports
14. Develop skills to effectively communicate scientific information through oral presentations
15. Develop skills to critically evaluate scientific information
16. Develop an ability to engage in scientific inquiry
17. Develop an ability to plan scientific experiments
18. Develop an ability to carry out scientific experiments
19. Access scientific information from various electronic and print sources
20. Apply scientific knowledge to societal issues
21. Appreciate the diversity of life
22. Build a strong foundation for potential graduate study
23. Develop a sense of competence in the field of study

2. ASSESSMENT STRATEGIES (See Appendix A for revision details to original plan)

Strategy	Description	Timeline	Person(s) Responsible	Outcomes Assessed	Findings reported to:
Course Assessments (grades)	Evaluation of student performance in each course by instructor	Through-out each term	Instructor(s) of each course	1-21	Students, Registrar
Faculty Report of Student Learning - Program	Articulate for each program learning objective: which course actively teaches and assesses that objective. What student strengths/weaknesses are being noted by program faculty?	Spring 2007 Winter 2008 (See Appendix B for details)	Instructor(s) of each course,	1-23	Department Faculty, Instructional Programs Committee, Department Chair, Assoc. Dean of Life Sciences, Assessment Council
Faculty Report of Student Learning – Course	Articulate for each course: student learning objectives (to be derived from/informed by program learning outcomes) and assessments for each objective.	Tabled (See Appendix B for details)	Instructor(s) of each course	1-23	Department Faculty, Instructional Programs Committee, Department Chair, Assoc. Dean of Life Sciences, Assessment Council
Course and Instructor Evaluation Reports	Summarize, distribute, review quantitative and qualitative data from student feedback. Follow-up with individuals below 3.0 standard on "course as whole" and "overall instructor grade" items. Make recommendations to Awards Cmte.	Following each term	Office Staff	8, 9, 12, 20, 21, 23	Department Faculty, Instructional Programs Committee, Department Chair, Associated Students of Madison
Exit Survey	Self-report survey by graduating seniors about their experience, preparation, and plans.	For each graduating class	Student Services Coordinator	1-23	Department Faculty, Instructional Programs Committee, Department Chair, Assoc. Dean of Life Sciences, Assessment Council
Long-Term Alumni Study	Survey of alumni regarding their experience and preparation in the major at 1 and 3 years post-graduation	2006	Student Services Coordinator	1-23	Department Faculty, Instructional Programs Committee, Department Chair, Assoc. Dean of Life Sciences, Assessment Council
DARS Analysis – Course Query for Zoology Majors	Review DARS reports of graduating seniors for coherence of program and appropriate course selection within the 4 tracks. Compare with findings from Faculty Reports of Student Learning.	Every year or as needed	Student Services Coordinator	1-5	Department Faculty, Instructional Programs Committee, Department Chair, Assoc. Dean of Life Sciences, Assessment Council
Newsletter	Including a tear-out alumni survey based on one or more objectives	Winter break	Student Services Coordinator	Varies	Department Faculty, Instructional Programs Committee, Department Chair, Assoc. Dean of Life Sciences, Assessment Council, Web Page

3. OVERVIEW OF FINDINGS
(Detail in Appendix C)

a. Much of the data provided further support for our current understanding of program strengths and weaknesses and priorities.
    a. Strengths: flexibility and variety of courses, opportunity for research and hands-on learning from independent directed study, providing understanding of biological complexity
    b. Priorities for improvement: mid-level cell bio/genetics core course, more field/lab offerings incorporating experiment planning, execution and presentation, career exploration, understanding of phylogeny and taxonomy

b. Some necessitated a closer look:
    a. Comparison of Faculty and Student responses to Expected Student Learning Outcomes surveys to identify program strengths and weaknesses

        i. Students and Faculty identified quantitative thinking about biology as a potential weakness. We discussed requiring Statistics. After a DARS Analysis, we found that ~68% of zoology graduates already were taking a stats class to satisfy BS requirements. However, the students may be taking this late in the program, which does not benefit their early years. DARS analysis shows an increase in enrollment in statistics courses from 2006 to 2008, from 82 to 120.

        ii. Students and Faculty identified weakness in the general understanding of genetics. DARS Analyses of Zoology cohorts indicate a decreasing trend in enrollment in Zoo 466 – Genetics from 2006 to 2008. Among Zoology courses, it is reasonable that only a few courses offer this topic as a course goal, as it is a specialty subject. However, the identified weakness in student understanding confirms a need for either a Genetics 466 requirement or mid-level genetics course as requirement of the Zoology Program.

        iii. Students and Faculty identified weaknesses in the ability of students to plan and carry out scientific experiments as well as communicate scientific information through oral presentation. Although some courses provide this learning experience, not all majors take these courses. Thus, there is a need for incorporating the scientific process and presentation better into mid-level courses – or requiring an I/A level lab course with oral presentation as part of program.

        iv. Faculty also recognized potential weakness in student learning of phylogenetic analysis and taxonomy. Need for possible curriculum adaptation to address subjects.

4. RESPONSE AND NEXT STEPS – FUTURE RELATED ACTIVITIES

Discussion at Instructional Program Committee Meeting:

The committee has discussed and made recommendations about possible changes in program requirements including genetics, taxonomy, and phylogenetic analysis, research planning, execution and presentation, statistical and analytical learning opportunities incorporated into curriculum, recommending statistics course earlier in program to benefit them in I/A zoology courses

Additional Proposed Undergraduate Assessment Activities include:

Surveying current students needs to discover what areas students would like more programming in (service-learning, study abroad, internship fairs, etc.)

Tracking student records databases will allow us to compile reports about quantity and distribution of program participants, including demographic and academic descriptors, such as gender, age, class standing, GPA, student-athlete status, and more. This will allow us to maintain records of who is participating in our programs can have important implications for advising, policy, practice, and outreach.

Continuing our Course Enrollment Monitoring allows us to track trends including course fill rates, drop patterns, and low enrollment assists in planning, resource allocation, instructional programming and advising.

Appendix A

Revisions to Assessment Plan

a. Decided NOT to implement a 5 year post-graduation survey for long-term data. Upon consulting with Elaine Klein, we determined that the data would be difficult to use for programmatic change and that the cost/value analysis for collecting the data would be negative. Elaine encouraged us, as an alternative, to consider shifting the focus to current student learning – suggesting current student focus groups as a possible strategy. We were unable to implement this in the current review but hope to do so in the future assessments of the zoology program.
b. Decided to implement Undergraduate Exit Survey following every spring and fall semester, combined results for annual summary when possible.
c. Derived Expected Student Learning Outcomes from the faculty-approved undergraduate program goal statements. These Outcome statements have improved measurability for assessment purposes.
    a. Expected Student Learning Outcomes statements were incorporated into current Undergraduate Exit Survey tool
    b. Expected Student Learning Outcomes statements were incorporated into two newly designed and proposed assessment tools:
        a. Faculty Report of Student Learning – Program (accepted)
        b. Faculty Report of Student Learning – Course (tabled)

Appendix B

New Assessment Tool Report

a. Faculty Report of Student Learning – Program - Implemented

Objective:

a. Is each Expected Student Learning Outcome being addressed through courses currently offered?
b. What Outcomes are most/least represented? Does this distribution say anything about program emphases?
c. Where are individual courses filling outcome needs? In conjunction with DARS analysis, are students completing a complement of courses that address each outcome area?
d. Where are faculty seeing strengths/weaknesses in student learning (presumably of zoology majors, though courses contain multiple majors)?
e. What recommendations does the faculty have to address program-wide weaknesses in student learning?

b. Faculty Report of Student Learning – Course - Tabled

Objective:

a. Encourage faculty to use program-learning outcomes as a frame of reference when articulating course-level student learning outcomes.
b. To provide structure for current Activities Report exercise: *"One paragraph description of course that relates to goals of the Zoology Major"*
    a. Focus faculty and student awareness and attention on program-wide outcomes.
    b. Encourage sharing course and program outcome expectations with students; create a dialog about course and program outcomes to help students understand why these outcomes have been defined as mission-critical
c. Encourage faculty to articulate a plan for how each primary course-level learning outcome is addressed in the course, how learning of the outcome is assessed, and how the learning will be evidenced
d. Following each semester, faculty reflect briefly on how well the plan worked, consider any changes to make next time, and provide any feedback to IP Committee to inform discussions at program level.

Many complications exist in the implementation of this tool. It is more involved and time-consuming than the Program level tool. Foresee difficulty getting non-zoology faculty in our cross-listed courses to participate. While faculty agrees on the goal statement, exactly how/by what methods the learning outcomes statements would be developed has raised some concern.

Appendix C

Assessment Activities Completed

A. Long-Term Alumni Study – 3 yr. out survey. (Spring ’06)
B. Undergraduate Exit Survey (May and Dec. ’06, May ’07, May and Dec. ’08)
C. Faculty Report of Student Learning – Program (Spring 2007, Winter 2008)
D. DARS Analysis utilizing Query Library
   (May and Dec. ’06, May and Dec. ’07, May and Dec. ‘08)
E. Course Assessments (grades) and Course and Instructor Evaluation Reports
   (every semester, ongoing)

Findings of Assessment Efforts

A. Long-Term Alumni Study – 3 yr out survey
   a. Well prepared in:
      broad based understanding of zoological concepts
      the application of biological concepts to societal issues
      the interrelationships of human and natural systems
      biological complexity
   b. Weaker in:
      genetics
      scientific literature searches
   c. Program strengths:
      teaching
      variety of classes and program flexibility
      opportunities to learn by doing: research, labs, extracurricular
   d. Suggestions for improvement:
      career exploration and counseling
   e. Opinion of major value/requirements changed over time?:
      encourage more research
      academic prep small part of building career – real world
         experience bigger part
   f. Words of Wisdom for current students:
      Study hard, might not seem relevant now but will be
      Do career exploration
      Get real-world experience

B. Undergraduate Exit Surveys (Summary five semesters Spring ’06 – Fall ’08
   * data missing from Fall ‘07)
   a. 90% satisfaction with program overall
   b. 75-90% confident they will achieve immediate career goal w/in 1 yr
   c. 85-95% agree faculty are genuinely interested in student learning
   d. 90-100% satisfaction with overall quality of instruction
   e. Greatest gains made (80% or more students agree):
      Helped me understand current issues in biology

Fostered an appreciation of the diversity of life
Helped me understand biological complexity
Helped me understand the interrelationship of humans and natural systems
Helped me understand how scientific information is obtained
Written communication skills
Understanding of ecology
Understanding of evolution

f. Least gains made (less than 70% of students believe these were gains):
Understanding of genetics
Oral communication skills
Expanded my awareness of career fields that exist related to zoology
Helped me develop an ability to plan experiments
Leadership skills

g. Relevant or personally meaningful
Labs, research, undergrad TAs, field trips, specific lectures

h. 80-100% satisfied with advising includes both faculty advising and advising from student services coordinator

i. Steady increase in agreement with the following statements:
'There were ample opportunities to participate and apply classroom knowledge in settings such as laboratory classes, research projects, internships, community service projects, student orgs, etc.'; and 'I received timely information regarding events and opportunities on campus'.

j. Steady increase in outside of class participation in biological activities

C. Faculty Report of Student Learning – Program (Spring '07 and Winter '08)

a. Each Expected Student Learning Outcome IS being addressed in four or more of the courses currently offered

b. Goals represented in greater than or equal to 75% of courses offered include:
Understand how scientific information is obtained
Develop a sense of competence in the field of study
Build a strong foundation for potential graduate study
Understand biological complexity
Develop an ability to engage in scientific inquiry
Develop critical thinking skills

c. Goals represented in less than 60% of courses offered include:
Develop an ability to carry out scientific experiments
Develop skills to effectively communicate scientific information through oral presentations
Apply scientific knowledge to societal issues
Develop an ability to plan scientific experiments
Understand the interrelationship of humans and natural systems
Develop quantitative reasoning skills

d. Faculty report the following strengths in student learning in the following areas after taking zoology courses (>87.5%):
    Scientific writing skills
    Critical thinking and problem solving
    Ability to read/interpret data
    Understanding of evolution
e. Faculty report the following weaknesses in student learning in the following areas after taking zoology courses (<75%):
    Understanding of basic chemistry
    Basic mathematical skills
    Basics of probability and statistics
    Oral presentation skills
f. Faculty recommend the following actions to address weaknesses in student learning:
    Emphasize/incorporate more quantitative work into each class
    Require a statistics course for majors in zoology
    Provide multiple exposures to interrelationships among zoology and other math and science disciplines
    Provide lower enrollment sections that allow students practice in oral presentation

D. DARS Analysis
a. 2008: n=142
    1. Introductory Biology: 101/102 (56); 152 (68); Biocore (6)
    2. Most popular upper-level courses (in order):
        a. 360 Extinction of Species (61)
        b. 350 Parasitology (57)
        c. 470 Animal Development (50)
        d. 315 Limnology (39)
        e. 460 General Ecology (37)
        f. 570 Cell Biology (36)
        g. 410 Evolutionary Biology (35)
        h. 430 Comparative Anatomy (34) & Comparative and Evolutionary Physiology (34)
        i. 520 Ornithology (33)
        j. 466 Genetics (32)
        k. 425 Evolution of Behavior (31)
    3. Statistics: 301/371/541 (120)

b. 2007: n=133
    1. Introductory Biology: 101/102 (52); 152 (60); Biocore (4)
    2. Most popular upper-level courses (in order):
        a. 360 Extinction of Species (73)
        b. 335 Human/Animal Relationships (54)

c. 315 Limnology (42)
d. 470 Animal Development (40)
e. 410 Evolutionary Biology and 430 Comparative Anatomy and 570 Cell Biology (39)
f. 425 Evolution of Behavior (36)
g. 466 Genetics (35)
h. 350 Parasitology (33)

3. Statistics 301/371/541 (79)

c. 2006: n=141
1. Introductory Biology: 101/102 (47); 152 (70); Biocore (4)
2. Most popular upper-level courses (in order):
a. 360 Extinction of Species (74)
b. 335 Human/Animal Relationships (57)
c. 315 Limnology (56)
d. 470 Animal Development (51)
e. 410 Evolutionary Biology (46)
f. 466 General Genetics (44)
g. 460 General Ecology (42)
h. 430 Comparative Anatomy (38)
i. 510 Ecology of Fishes and 570 Cell Biology (35)
3. Statistics 301/371/541 (82)

E. Course Assessments (grades) and Course Instructor Evaluation Reports
1. Individual summary reports for each semester are sent out to faculty and academic staff and are available in Zoology Department Office file for review.

Appendix D

COMPREHENSIVE DISSEMINATION OF ASSESSMENT FINDINGS

Report to:	Person(s) Responsible	Timeline
Instructional Programs Committee	Student Services Coordinator[1]	Throughout academic year
Department Faculty	Dept. Chair[1], Student Services Coordinator[1], IP Committee Chair[2]	November Faculty Meeting
Associate Dean of Life Sciences and University Assessment Council	Department Chair[1], Student Services Coordinator[1], IP Committee Chair[2], Assistant to Chair[2]	May