Department/Program: Zoology
Academic Year of Report: 2013-2014
Date Submitted: 15 September 2014
Report author: Chris Hoagstrom

Contact Information:
  Phone: 801-626-7486
  Email: christopherhoagstrom@weber.edu
A. **Brief Introductory Statement:**

Please review the Introductory Statement and contact information for your department displayed on the assessment site: [http://www.weber.edu/portfolio/departments.html](http://www.weber.edu/portfolio/departments.html) - if this information is current, please indicate as much. No further information is needed. We will indicate “Last Reviewed: [current date]” on the page.

If the information is not current, please provide an update:

The Brief Introductory Statement displayed at the above address is current.
B. Mission Statement
Please review the Mission Statement for your department displayed on the assessment site:
http://www.weber.edu/portfolio/departments.html - if it is current, please indicate as much; we will mark the web page as “Last Reviewed [current date]”. No further information is needed.

The Mission Statement displayed at the above address is current.
C. Student Learning Outcomes
Please review the Student Learning Outcomes for your department displayed on the assessment site:
http://www.weber.edu/portfolio/departments.html - if they are current, please indicate as much; we will mark the web page as “Last Reviewed [current date]”. No further information is needed.

Student-learning outcomes displayed at the above address are current.
D. Curriculum
Please review the Curriculum Grid for your department displayed on the assessment site: http://www.weber.edu/portfolio/departments.html - if it is current, please indicate as much; we will mark the web page as “Last Reviewed: [current data]”. No further information is needed.

The curriculum grid shown at the above address is current.
E. Assessment Plan
Please review the Assessment Plan for your department displayed on the assessment site:
http://www.weber.edu/portfolio/departments.html - if the plan current, please indicate as much; we will mark the web page as “Last Reviewed [current date]”. No further information is needed.

The assessment plan shown at the above address is not current and is presently under review within the Department of Zoology.
F. Report of assessment results for the most previous academic year:

I. Student Profile
During the 2013-2014 academic year, the Department of Zoology provided a total of 10,426 student contact hours (SCHs) and graduated 26 Zoology-major and 8 Zoology-minor students.

II. Assessment Data

1. Grade point averages of graduates: 25 students averaged a 3.48 ± 0.31 SD gpa (according to WSU transcripts; Figure 1, below).

![Graph showing grade point averages for Zoology graduates](image)

**Figure 1.** Distribution of grade-point averages for Zoology graduates ($n = 25$) by academic year. Boxes show the median (center line), 25th and 75th percentiles (box ends), 10th and 90th percentiles (whiskers), and outliers (points). The mean is shown as a dotted line.
B. Performance on standardized exams

1. Medical College Admission Test (MCAT): six students averaged $28.3 \pm 3.5$ SD of a possible 45 points. Specifically, scores were between the 31.7\textsuperscript{th} and 87.2\textsuperscript{nd} percentiles of all students taking the 2013 test, with 5 of 6 students scoring in the 66.8\textsuperscript{th} percentile or above (Figure 2, below).

\textbf{Figure 2.} Scores of Zoology graduates who have taken the Medical College Admission Test (MCAT) as percentile rank within all students taking the 2013 test.
C. Pre- and post-course testing:

1. Pre- and post-testing was conducted in one section of Cell Biology (Zool 3200). Results are summarized below by the instructor, Dr. Trask:
   a) “My syllabus for this class was modified to be more explicit in the learning outcomes. To address my success in these outcomes, I implemented pre- and post- tests that students completed on the first and last days of class, respectively. The same 15-point test was used on both days. Average student scores on day 1 was 7 out of 15; last day of class average scores were 9.5 indicating a modicum of content acquisition (~15% gain). Of the 22 students who took both the pre- and post- tests, 1 student score decreased, 1 stayed the same, and the remaining 20 students had improved scores. I was disappointed that student scores did not improve more significantly over the course of the semester. Before teaching this class again I will look carefully at the content being examined on this test, potentially modifying it to better reflect the amount of class time spent on the topics being addressed. I gave the post-test on the last day of class along with a quiz—in the future, I will separate these two assessments as I believe that students may have spent the bulk of class time completing the quiz (the score on which was calculated into the final course grade) rather than the post-test (the score on which had no bearing on overall course grades).”
D. High-impact learning practices (examples*):

*Note: This list of high-impact learning practices is not intended to be complete or comprehensive. It merely provides a list of noteworthy activities, particularly those revised or newly implemented in the 2013-2014 school year. Many similar practices are already ongoing and have long been routine within various courses or as part of the usual research activities of Zoology faculty. For example, it is common in many, if not most upper-division and elective courses for activities to include one or more high-impact activities such as assigned reading and discussion of scientific articles, group discussion, student presentations, group activities etc. That being said, the list below does provide a glimpse into and cursory summary of myriad high-impact activities that occur within the Department of Zoology.

1. In-class activities:
   a) Human Biology (Zool 1020) small-group and whole-class discussions and exercises on a series of focused topics (Dr. Trask)
   b) Human Biology (Zool 1020) students devise hypothesis, design relevant experiments, and conduct experiments (Dr. Berthélémy)
   c) Principles of Zoology I (Zool 1110) taught in a “flipped” format with ~ 50% of class time devoted to collaborative student work (Dr. Mull)
   d) Human Physiology (Zool 2200) the method of “formative testing” was implemented (Dr. Berthélémy)
   e) Cell Biology (Zool 3200) essay on the book “The Immortal Life of Henrietta Lacks” (Dr. Trask)
   f) Cell Biology (Zool 3200) students created videos on assigned topics to be used as teaching videos in class (Dr. Trask)
g) Wildlife Ecology and Management (Zool 4470) students were required to develop a research project on state wildlife and they disseminated their research results as oral presentations at the end of the semester (Dr. Cavitt).

h) Ornithology (Zool 4670) students were required to develop undergraduate field research projects in the discipline and they disseminated their research results as oral presentations at the end of the semester (Dr. Cavitt).

i) Seminar (Zool 4990) 14 students in selected and presented on a variety of topics (Dr. Marshall)

j) Seminar (Zool 4990) redesigned to focus on student-led discussions (Dr. Mull)
2. Laboratory exercises:

a) All but three of the 23 offered required or elective courses for the major include a laboratory as part of the course. Laboratory sections meet once per week and students engage in a variety of hands-on activities associated with a given course. This can include observing specimens, dissections, and experiments. This can also include reading scientific articles, group discussions, and group projects. Labs complement lecture materials and provide an interactive learning environment.

b) Eleven courses offered in the Department of Zoology generally require written laboratory reports that summarize student laboratory exercises. These are written in the style of scientific papers, complete with introductions, materials and methods, data analysis and presentation, discussion, and a bibliography of primary literature. Some upper-division courses include a process by which reports are written, submitted as a draft, and then revised based on instructor comments.

3. New laboratory exercises:

a) Cell Biology (Zool 3200) Drs. Clark and Trask developed all new laboratories closely correlated with lecture material

b) Genetics (Zool 3300) Dr. Clark developed all new laboratories closely correlated with lecture material and used by all instructors

c) Molecular Genetics (Zool 4300) Dr. Clark developed all new laboratory exercises coordinated with a series of case studies

d) Human Physiology (Zool 2100) Dr. Skopec implemented new and improved laboratory exercises and saw a 0.5 point improvement in student-review ratings for lab when compared to Spring 2013. The new laboratory activities were also adopted by Dr. Berthélémy.

e) Human Physiology (Zool 2200LONL) Dr. Skopec designed two new laboratory activities for cell physiology and muscle physiology. Both activities involve hypothesis-driven, hands-on experiments with data collection done by distance students at home.
4. Student laboratory instructors:

a) Advanced Human Anatomy (Zool 4900) students are laboratory instructors for Human Anatomy (Zool 2100). These students (15 or more per semester) receive detailed weekly instruction for teaching lab sections and then teach laboratories themselves or in two-student teams (Drs. Berthélémy, Chung, and Meyers).

b) Laboratory instructors for Human Physiology also enroll in Zool 4900 and gain extensive experience as instructors of weekly laboratories (Drs. Berthélémy, Skopec, and Trask).

5. Civic-engagement exercises:

a) 18 students in Mammalogy (Zool 4680, Dr. Zeveloff) engaged in team projects to benefit mammal conservation including:
   (1) Raising several hundred dollars to benefit endangered chinchillas
   (2) Development of a non-profit organization “Save the Ringtails”, which includes a web site now active (http://savetheringtails.org/).
     (a) The site was featured on the e-bulletin of the International Union for Conservation of Nature’s Species

b) 22 students in Conservation Biology (Zool 3500, Dr. Zeveloff) engaged in team projects to benefit conservation including:
   (1) Additional work on savetheringtails.org (above)
   (2) Planning and holding a “Conservation Festivus” in the WSU Student Union Building
   (3) Arranging a concert in a local venue to benefit orangutans
6. Undergraduate research projects:

a) Two students mentored by Dr. Zeveloff conducted field research on bat communities in northern Utah, in collaboration with a biologist from the Utah Division of Wildlife Resources, Adam Brewerton. These students presented their research finding at the WSU Undergraduate Research Symposium:
   

b) One student mentored by Dr. Marshall curated the Zoology Department amphibian and reptile collection.

c) Two students mentored by Dr. Clark studied genetics of invertebrates and microbes. Each applied for and received a grant from the WSU Office of Undergraduate Research and each presented their findings at the WSU Undergraduate Research Symposium:

   (1) Christopher Hill. $3494. Research Fellowship, Denkers Family Foundation.

   (2) Son Nguyen. $2500. Paul and Carolyn Thompson Research Scholarship.


d) Two students co-mentored by Dr. Trask studied potential association between behavior and certain isoforms of a transport protein for the neurotransmitter serotonin and each presented their findings at the WSU Undergraduate Research Symposium:


(2) Linford, D., Trask, B., and Schmolesky, M. The Association Between the Serotonin Transporter Promoter Region Polymorphism and Aggressive Behavior

e) One student mentored by Dr. Berthélémy conducted an independent study of factors affecting lung diseases (especially asthma), diabetes, and obesity.

f) Four students mentored by Dr. Berthélémy studies effects of various substances on brine shrimp.

g) Two students mentored by Dr. Chung studied student learning and success in Human Anatomy (Zool 2100)

h) One student co-mentored by Drs. Chung and Okazaki studied genetic analysis of nemertean Heat Shock Proteins transcriptional and translational regulatory mechanisms

i) One student mentored by Dr. Chung studied impact of various phenolic estrogen-like compounds found in common use anti-microbials, anti-fungals and Non-Steroidal Anti-Inflammatory Drugs on reproductive function in the nematode *Caenorhabditis elegans*
j) Four students mentored by Dr. Skopec studied woodrat caching and maintained a colony of 30 captive woodrats. Two of these students presented findings at the Society of Integrated and Comparative Biology annual meeting and one of them also presented at WSU Day at the Utah State Capitol and the WSU Undergraduate Symposium:


k) Three students mentored by Dr. Skopec studied effects of grazing on the endangered Autumn Buttercup.

l) Two students mentored by Dr. Skopec studied foraging patterns in Pygmy Rabbits.

m) One student mentored by Dr. Skopec studied the amazing process of antler growth.

n) One student mentored by Dr. Skopec studied regulatory factors of CYP2B.

o) One student mentored by Dr. Mull studied the bee fauna of Snow Canyon State Park, applied for and received a grant from the WSU Office of Undergraduate Research, and presented findings at the National Conference on Undergraduate Research:

(1) Andrew Corbin, $3500. Research Fellowship


p) One student mentored by Dr. Mull studied bear-poppy seed dispersal and applied for and received a grant from the WSU Office of Undergraduate Research

(1) Chris Hunsaker, $3500. Research Fellowship
q) One student mentored by Dr. Mull studied effects of parasitic worms on the behavior of isopod crustaceans.

r) One student mentored by Dr. Mull assisted with data processing and analysis on forest research.

s) One student mentored by Dr. Cavitt studied incubation constancy of American Avocets and presented findings in four places:
   (1) Utah Conference on Undergraduate Research
   (2) Weber State University Symposium and Celebration
   (3) National Conference on Undergraduate Research
   (4) Upcoming: 26th International Ornithological Congress

t) One student mentored by Dr. Cavitt assisted with GIS mapping of American Avocet breeding distribution at Great Salt Lake.

u) One student mentored by Dr. Cavitt studied population growth of Eurasian Collared Doves in Utah and presented findings in two places:
   (1) WSU Day at the Capitol, March 3, 2014
   (2) WSU Undergraduate Research Symposium and Celebration, March 31, 2014

v) Three students mentored by Dr. Cavitt engaged in GIS mapping of western colonial water birds to determine the distributions of breeding colonies of colonial water birds:
   (1) http://departments.weber.edu/avianecologylab/WesternWaterbirdAtlas/atlas.html
   (2) http://www.fws.gov/mountain-prairie/species/birds/western_colonial/

w) One student mentored by Dr. Cavitt prepared and curated avian specimens for the Department of Zoology bird collection.

x) One student mentored by Dr. Cavitt studies the population ecology of Mule Deer.
Four students mentored by Dr. Meyers studied functional morphology in various animals, which produced two presentations at the Society for Integrative and Comparative Biology:


One student mentored by Dr. Okazaki studied RNA activity during stress protein response in nemerteans exposed to hyperosmotic and hyposmotic salinities.

Cooperative work experience:

a) Three students engaged in cooperative work experience in fields of their choice, mentored by Dr. Mull

Bachelor of Integrated Studies (BIS) Capstone project:

a) One student studied the Link Between Zonulin and the Development of Autoimmune Disorders, such as Celiac Disease.
E. Time to graduation in years

1. Time to graduation from first term attended at WSU
   a) Figure 3 (below).

![Figure 3](image-url)

**Figure 3.** Distribution of time to graduation for Zoology graduates \((n = 24)\), based on time after the first term of enrollment at Weber State University (WSU), by academic year. Boxes show the median (center line), 25th and 75th percentiles (box ends), 10th and 90th percentiles (whiskers), and outliers (points). The mean is shown as a dotted line.

2. Time to graduation from first enrollment in a Zoology majors course, ZOOL 1110 and above
   a) Figure 4 (below).
Figure 4. Distribution of time to graduation for Zoology graduates ($n = 24$), based on time after the first enrollment in a Zoology course required for a major in Zoology at Weber State University (WSU), by academic year. Boxes show the median (center line), 25th and 75th percentiles (box ends), 10th and 90th percentiles (whiskers), and outliers (points). The mean is shown as a dotted line.
F. Available information on next-step success for 2013-2104 graduates/post-graduate-school applicants (n = 27)

1. Internships/Job Placement
   1. Joshua Bradford Masters of Public Health program at the University of Utah
   2. Amanda Buchmuller status unknown
   3. Megan Cook is employed with the Utah Medical Examiner’s office as an autopsy assistant
   4. Zachary Gregory is employed with the Wyoming Game and Fish Department
   5. Nathan Hansen is employed at J & J Nursery and Garden Center, Layton
   6. Kelsey Paolini is employed as an intern at the Shedd Aquarium, Chicago
   7. Jennifer Robinson is employed in the WSU Information Technology Division
   8. Randi Rollins is employed with Myriad Genetics, Salt Lake City
   9. Creighton Shumway is employed with Megaware Keelguard, Ogden
   10. Amy Trossarello is seeking a job in environmental education or marine biology
   11. Ashley Van Leuven is a dental/surgical assistant at Dr. C. Ray Moser endodontics
   12. Lexie Wayman is employed with Eagle Eye Produce, Layton as Food Safety Supervisor
   13. Adam Winegar is employed with the Utah Division of Wildlife Resources

2. Graduate and professional school placement
   1. Amanda Alston will apply to physician assistant schools in 2015
   2. Geoffrey Beck is attending Saint Louis University School of Medicine
   3. Zackrison Campbell is attending pharmacy school in Hawaii
   4. Linsey Christensen will apply for medical school in 2015
   5. Andrew Corbin is attending University of Texas at Arlington
   6. Landon Favero will apply to physician assistant schools in 2015
   7. Josiah Greer will apply for medical school in 2015
   8. Christopher Hill is attending Penn State University College of Medicine
   9. Chase Jeppesen is attending Arizona College of Osteopathic Medicine, Midwestern University
   10. Zachariah Knight is attending a post-baccalaureate pre-med program at Lake Erie College of Osteopathic Medicine
   11. Eric Linsley is attending the University of Utah School of Dentistry
   12. Laura Palmere is attending Loyola-Stritch School of Medicine
   13. Chelsie Thomas is attending the College of Osteopathic Medicine, Pacific Northwest University of Health Sciences
   14. Cory Veigel is attending the University of Louisville School of Dentistry
3. Exit-interview results: Table 1 (below).

**Table 1** -- Graduating Student Questionnaire Scores – 2013-2014 – Number of students participating in poll = 24

<table>
<thead>
<tr>
<th>Question and scale</th>
<th>Mean ± SD 1 to 5 scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. After completing my degree, my knowledge of the scientific method is: 1 (the same) to 5 (much better)</td>
<td>4.7 ± 0.56</td>
</tr>
<tr>
<td>2. After completing my degree, my knowledge of evolution is: 1 (the same) to 5 (much better)</td>
<td>4.7 ± 0.48</td>
</tr>
<tr>
<td>3. After completing my degree, my knowledge of genetics is: 1 (the same) to 5 (much better)</td>
<td>4.3 ± 0.82</td>
</tr>
<tr>
<td>4. After completing my degree, my knowledge of the structure and function of animals is: 1 (the same) to 5 (much better)</td>
<td>4.6 ± 0.72</td>
</tr>
<tr>
<td>5. After completing my degree, my knowledge of the organization of life, from molecules to ecosystems is: 1 (the same) to 5 (much better)</td>
<td>4.7 ± 0.55</td>
</tr>
<tr>
<td>6. After completing my degree, my knowledge of ecology and the effect of humans on the biosphere is: 1 (the same) to 5 (much better)</td>
<td>4.7 ± 0.46</td>
</tr>
<tr>
<td>7. My education in zoology has provided me with an awareness of career opportunities available in zoology: 1 (strongly disagree) to 5 (strongly agree)</td>
<td>4.1 ± 0.95</td>
</tr>
<tr>
<td>8. My education in zoology has prepared me for employment or for graduate or professional school: 1 (strongly disagree) to 5 (strongly agree)</td>
<td>4.6 ± 0.65</td>
</tr>
<tr>
<td>9. My education in zoology has provided me with an understanding of how scientific ideas are communicated: 1 (strongly disagree) to 5 (strongly agree)</td>
<td>4.5 ± 0.66</td>
</tr>
<tr>
<td>10. My education in zoology has enhanced my oral and written communication skills: 1 (strongly disagree) to 5 (strongly agree)</td>
<td>4.5 ± 0.59</td>
</tr>
<tr>
<td>11. My education in zoology has enhanced my critical thinking abilities: 1 (strongly disagree) to 5 (strongly agree)</td>
<td>4.8 ± 0.44</td>
</tr>
</tbody>
</table>
**Appendix B:** Please provide the following information about the full-time and adjunct faculty contracted by your department during the last academic year (summer through spring). Gathering this information each year will help with the headcount reporting that must be done for the final Five Year Program Review document that is shared with the State Board of Regents.

<table>
<thead>
<tr>
<th>Zoology Faculty</th>
<th>2013-14</th>
</tr>
</thead>
<tbody>
<tr>
<td>Headcount</td>
<td>15</td>
</tr>
<tr>
<td>With Doctoral Degrees (Including MFA and other terminal degrees, as specified by the institution)</td>
<td>12</td>
</tr>
<tr>
<td>Full-time Tenured</td>
<td>12</td>
</tr>
<tr>
<td>Full-time Non-Tenured (includes tenure-track)</td>
<td>0</td>
</tr>
<tr>
<td>Part-time</td>
<td>0</td>
</tr>
<tr>
<td>With Master’s Degrees</td>
<td>2</td>
</tr>
<tr>
<td>Full-time Tenured</td>
<td>0</td>
</tr>
<tr>
<td>Full-time Non-Tenured</td>
<td>0</td>
</tr>
<tr>
<td>Part-time</td>
<td>2</td>
</tr>
<tr>
<td>With Bachelor’s Degrees</td>
<td>1</td>
</tr>
<tr>
<td>Full-time Tenured</td>
<td>0</td>
</tr>
<tr>
<td>Full-time Non-tenured</td>
<td>0</td>
</tr>
<tr>
<td>Part-time</td>
<td>1</td>
</tr>
<tr>
<td>Other</td>
<td>0</td>
</tr>
<tr>
<td>Full-time Tenured</td>
<td>0</td>
</tr>
<tr>
<td>Full-time Non-tenured</td>
<td>0</td>
</tr>
<tr>
<td>Part-time</td>
<td>0</td>
</tr>
<tr>
<td>Total Headcount Faculty</td>
<td>15</td>
</tr>
<tr>
<td>Full-time Tenured</td>
<td>12</td>
</tr>
<tr>
<td>Full-time Non-tenured</td>
<td>0</td>
</tr>
<tr>
<td>Part-time</td>
<td>3</td>
</tr>
</tbody>
</table>
Please respond to the following questions.

1) Reflecting on this year’s assessment(s), how does the evidence of student learning impact your faculty’s confidence in the program being reviewed; how does that analysis change when compared with previous assessment evidence?

The Zoology faculty is perennially confident in the Zoology program because it is well designed and long-tested. The results of a single year’s outcomes cannot be viewed in isolation from previous years or decades of experience and a long-standing history of graduate success. Further, all faculty members are engaged in their courses and work each semester to update and improve course materials. Beyond this, all faculty members are actively engaged in scholarly research, which ensures they remain current in their fields of interest and excited about Zoology.

That being said, evidence available for this year’s assessment is highly indicative of teaching success.
   1. Graduates rated their experiences in the Department highly.
   2. Many students were closely engaged with faculty members in zoological research, indicating that they received intensive, high-impact instruction, gained valuable hands-on experience, and were attracted to pursue research either through their coursework or through the charisma of faculty members.
   3. Almost all courses for majors included laboratories in which all students gained hands-on experience and had opportunities to interact with classmates and departmental faculty. Faculty members work continuously to improve laboratory experiences (examples above).
   4. Many courses also include high-impact teaching approaches in lecture sections and, in all cases, faculty continuously work to improve materials and approaches used (examples above).
   5. Student preparedness is indicated by the fact that 5 of 6 students applying for medical school scored above the 66th percentile and all five of these students have been admitted to medical school.
   6. The high grade-point average of Zoology graduates suggests preparedness, especially in light of the fact that five of these students scored well on the MCAT and have been admitted to medical school, along with others that have been admitted to dental school, pharmacy school, and graduate school or are now gainfully employed. Other students have made the personal decision to put off their applications for physician-assistant or medical school until 2015. Of the 27 2013-2014 graduates, only 1 (3.7%) is unemployed although looking for employment and 1 other (another 3.7%) has an unknown status.

2) With whom did you share the results of the year’s assessment efforts?

With Department of Zoology faculty and staff and with the Dean of the College of Science
3) Based on your program’s assessment findings, what subsequent action will your program take?

1. We will continue to emphasize proactive teaching approaches that include high-impact learning experiences for students.
2. We will continue to emphasize laboratories as an integral part of the Zoology curriculum because of their importance in providing ample hands-on and collaborative learning experiences for students as well as providing opportunities for more direct interactions between students and faculty.
3. We will continue to pursue our respective research interests and to involve students directly in our research both to provide unparalleled learning opportunities and to maintain our currency in and enthusiasm for the discipline of Zoology.