Challenges and successes in exposing community college students to field work and undergraduate research in a new introductory field biology course at the College of Southern Nevada

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Introduction

Few of the College of Southern Nevada (CSN) students I interact with consider careers in field biology. When asked why, most report they do not know much about field biology because too few opportunities exist. Knowing this, and the importance of attracting students to STEM careers, I solicited input from potential employers and developed a new course called Introduction to Field Biology (BIOL 211). BIOL 211 was approved by the Nevada System of Higher Education (NSHE) during 2012 and I offered it for the first time during the spring semester of 2013. It is a 4-credit lecture/lab course that meets six hours per week. The assessment plan for BIOL 211 is summarized in Table 1. Eleven sophomores and juniors enrolled in BIOL 211 during spring 2013. All maintained 4-14 credits of science and math and most worked an average of 30 hr per week.

Table 1 Assessment plan for BIOL 211 at CSN.

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Weight</th>
<th>Mode of Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assignments</td>
<td>35%</td>
<td>Lecture content; Exercises</td>
</tr>
<tr>
<td>Midterm Exam</td>
<td>20%</td>
<td>Lecture content; Exercises; Mock tortoise survey report; Mock field project proposal and BLM sampling permit application</td>
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<tr>
<td>Final Exam</td>
<td>20%</td>
<td>Lecture content; Exercises; Skills retention assessment (compass, GPS, maps, following protocol)</td>
</tr>
<tr>
<td>Poster Project/ Presentation</td>
<td>20%</td>
<td>Grasses Project (Bromus and Bouteloua student teams)</td>
</tr>
<tr>
<td>Extra-curricular</td>
<td>5%</td>
<td>Make sampling frames, bait balls, equipment lists, prepare data sheets, etc. or volunteer for NOODW or SNAPP projects</td>
</tr>
</tbody>
</table>

BIOL 211 is organized into lectures (e.g., field safety, geospatial data, fieldwork), demonstrations (e.g., RFID tag reading, telemetry, post-correction of GPS data), on-campus exercises, off-campus field excursions, and major field projects. I limited the number of lectures in the course to yield more time for hands-on learning. Geospatial data are an integral part of field work. Consequently, this topic was addressed thoroughly in the course (Figure 1).

Figure 1 Students learned how to use coordinate systems, topographic maps, map tools, a compass, GPS receivers, and GIS applications.

Major Field Projects

Grasses: Students compared invasive (Bromus rubens) and native grass (Bouteloua barbata) density in recently and historically burned 1 m² plots in Yucca and Blackbrush dominated habitat within Red Rock Canyon National Conservation Area. They also explored the relationship of grass density and distance from a trail.

Animals: Students conducted two nocturnal and two diurnal small animal surveys using pitfall sampling arrays and Sherman live trap transects at two different sites on the Springs Preserve. Captured animals were measured for length, weighed, sexed, and examined for the presence of ectoparasites.

Trees: Students surveyed tree density using the point-centered quarter method and assessed tree health in a Ponderosa Pine-White Fir community in the Mt. Charleston Wilderness Area within the Spring Mountain Range.

Instructor Challenges

1. Devising activities varied in scope, design, equipment requirements, habitats, and taxa to give students some breadth of experience during a single semester
2. Coordinating the varied activities including scheduling, agency permitting, land-owner permissions, and prepping equipment
3. Accumulating the appropriate reading materials
4. Transportation to field sites
5. Supervising 11 students in the field without assistants
6. None of the students had completed college statistics

Student Challenges (data derived from exit survey responses; n=11)

1. 5/11 reported how challenging it was to wake up on time
2. 4/11 reported how challenging it was to work in the field because of poor fitness level and rough terrain
3. Others reported lack of understanding of statistics, using a compass, and taking care to eat and drink enough while working in the field

Successes (most data derived from exit survey responses and final exam; n=11)

1. 10/11 were very satisfied with their decision to enroll in BIOL 211
2. 9/11 were extremely likely to recommend the course to others
3. 6/11 had their first experience with research while in BIOL 211
4. 11/11 had their first experience using statistics to interpret research data
5. Most reported that after completing BIOL 211 they are now likely or extremely likely to pursue field biology, graduate school, and research (Figure 2)
6. Most reported moderate to major improvement in field skills (e.g., Items 1-5 in On-campus Exercises); skills retention performance support perceived improvement
7. Numerous learning opportunities from field observations (e.g., explaining the most likely reason for why a lizard was impaled on a Yucca leaf)

Final Thoughts

The positive impacts BIOL 211 has had on its first cohort of students make it worthwhile to continue to offer the course and address its challenges. Early data suggest the course will attract more local students to careers in field biology or other STEM careers. BIOL 211 will be offered again during Spring 2014.

Acknowledgements

I wish to acknowledge Fred Jackson, CSN, and NSHE for supporting the development and funding of Introduction to Field Biology (BIOL 211) at CSN. I would also like to thank David Charlet, Dawn Nelson, Sue Wainscott, Carrie Preite, Sonja Djuricin, and Webster Mack for guest lectures, helping with some field exercises, and providing useful resources that improved curriculum. Finally, I would like to thank agency personnel at the Bureau of Land Management, Forest Service, US Fish and Wildlife Service, Nevada Department of Wildlife, Clark County Desert Conservation Program, Springs Preserve, and the San Diego Zoo Desert Tortoise Conservation Center for helping with site selection, issuing permits, lending resources, and providing extended learning opportunities for CSN students.