The GES Senior Research Thesis: A Locus for Program Level Learning Outcome Assessment

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Introduction

The Global Environmental Science (GES) program offers a B.S. degree through the Department of Oceanography in the School of Ocean and Earth Science and Technology. A defining characteristic of the program is the requirement for all majors to conduct a year-long senior research project working one-on-one with a faculty mentor. The research experience is directly integrated into the curriculum through several required courses and selection of electives. Graduation requirements include submission of a written thesis and a public oral presentation of the research findings. This integrated capstone research experience provides a locus for assessment of nearly all GES program learning outcomes.

GES Student Learning Outcomes

1. Define and explain the basic principles and concepts of chemistry, physics, biology, calculus, geology, geophysics, meteorology, and oceanography.
2. Apply their understanding of the fundamentals of science and mathematics to the description and quantification of the interactions of the atmosphere, hydrosphere, lithosphere, and biosphere, including humans.
3. Employ the scientific approach to problem solving, and hypothesis formation and testing.
4. Conduct scientific research, and analyze and evaluate results.
5. Demonstrate information literacy by collection and evaluation of scientific literature.
6. Express themselves clearly and concisely in written form.
7. Demonstrate skilled delivery of well organized informal and formal oral presentations.

Curriculum Map for Senior Thesis-Related Coursework

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<th>Requirement</th>
<th>Learning Outcome Addressed</th>
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<td>OCN 100 Seminar in Global Environmental Science</td>
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<td>OCN 490 Communication of Research Results</td>
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SLOs Assessed in ’09

SLOs directly related to conducting research have been evaluated in our graduating students. These include #3 (use of scientific method), #4 (data collection, analysis, and interpretation), #5 (information literacy), and #6 and #7 (communication of research results).

Assessment Methods

Evidence used in assessment of student learning comes from three main sources: 1) the written research thesis, 2) the public seminar by the student, and 3) a poster presentation of the research thesis. All students are required to submit a thesis and do an oral presentation. Students are encouraged to participate in poster presentations organized by the Honors Program.

The written theses are read and evaluated by the research mentor and the GES program chair. Assessment is currently by informal discussion. Prior to finalization of the thesis, students submit thesis abstracts and detailed outlines as assignments in OCN 490 Communication of Research Results. These assignments are evaluated by the course instructor and are peer reviewed in class.

The public oral presentations are evaluated by the research mentor and the GES Steering Committee, consisting of the program chair and three additional Oceanography faculty members. The oral presentations are initially developed during the OCN 490 class and students receive feedback from the course instructor and their peers. The practice presentations are video-taped to provide additional feedback to the students. Rubrics offered by the Oral Communication Focus Committee are used in the OCN 490 evaluation process.

Use of Results/Action Plan

The quality of GES student theses and oral presentations has been excellent. Two changes in curriculum are under consideration to address issues identified in the assessment discussions:

1) Development of an optional course that would aid students in identification of a thesis project and in formulation of a research hypothesis.

2) Addition of a requirement to do a poster presentation during the senior year.

To date, our assessments efforts have been conducted through group discussion, and with the exception of the OCN 490 course, data have not been compiled. A move towards quantification of assessment results will include development of rubrics for the written thesis and the oral presentations. The number of students in the GES program is small enough that all graduating seniors will be evaluated using the rubrics. A preliminary rubric for oral presentations will be test driven at the Fall ’09 thesis presentations.