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AY 2016-2017 Annual Student Assessment Report

Bachelor of Science in Environmental Science

1. Program Overview

Faculty:

Eran Hood, Professor of Environmental Science

Lisa Hoferkamp, Professor of Chemistry

Sanjay Pyare, Associate Professor of Environmental Science

Jason Amundson, Associate Professor of Geoscience

Brian Buma, Assistant Professor of Forest Ecology

Sonia Nagorski, Assistant Professor of Geology

The Environmental Science B.S. degree aims to provide students with rigorous interdisciplinary training in Earth Science, Chemistry, and Ecology. Program graduates are prepared for entry-level employment in resource agencies such as the Department of Environmental Conservation, the Department of Natural Resources, and the US Geological Survey. Environmental Science students are also well prepared to enter graduate programs in Earth Sciences and Ecology. The Environmental Science degree utilizes the natural laboratory available to students in southeast Alaska both through laboratories and hands-on field exercises and through guided research projects with Program Faculty. All program students are required to complete either an internship or an individual research project within the degree program.

The Environmental Science B.S. degree is closely aligned with the Geography (GEOG) and Environmental Resources B.S. degree. These two degrees share a number of required courses primarily in Earth and Geographic Information Sciences. However, the two degrees are fundamentally different in their aims. The ENVS degree is focused on developing a rigorous, quantitative understanding of the physical, chemical and ecological processes in Earth's surface and near-surface environments. This entails course work in Chemistry, Physics, Earth Science (e.g. Hydrology and Atmospheric Science), and Biology. In contrast, the GEOG B.S. degree is focused on understanding Earth from a geographic perspective (both Human and Physical), with a focus on course work in spatial analysis (e.g. Geography, Geographic Information Science, and Remote Sensing).

2. Program Student Learning Outcomes (SLOs)

1. Students understand the fundamental Earth systems, their organization, and how these systems interrelate

2. Students can collect and quantitatively analyze environmental data

3. Students can convey technical concepts in environmental sciences to other scientists and the public.

4. Student learn how environmental science is incorporated into different professional fields

5. Students can relate environmental science to broader societal issues and solutions

6. Students conduct research and/or gain experience working as an intern in an environmental field.

3. Data and Analysis for Student SLOs from Academic Year 2016-17

Program students are assessed on the first five learning outcomes based on specific assignments completed in classes that are required for the ENVS Degree. Assessment of the sixth learning outcome is based on the number of ENVS students who participate in research and internship opportunities in a field related to their major. For learning outcomes 1-5, the specific assignments that are assessed for program students are detailed in the ENVS Program Assessment Plan. Student performance for each learning outcome is rated by program faculty on a scale of 1-6. There are three categories within this range: 1-2 represents "Does Not Meet Expectations", 3-4 represents "Meets Expectations", and 5-6 represents "Exceeds Expectations". The sixth learning outcome is evaluated both quantitatively and qualitatively based on the number and type of student research and internship experiences in a given academic year.

The average score for each learning outcome is detailed in Table 1 below. The scores indicate that, on average, ENVS students are meeting program expectations with the exception of learning outcome 4, which is related to understanding the relationship between program content and professional fields related to environmental science. The program response to this deficiency is that the capstone environmental science seminar (ENVS 492) is being overhauled to highlight environmental career opportunities for students in the ENVS program. In addition, the score for learning outcome 1 is on the low end of meeting program expectations. The source of this deficiency is largely students' lack of understanding of the physical inter-relationships between different Earth systems. As a response, faculty will be putting an emphasis on improving assignments that deal with multiple Earth systems in several upper division ENVS classes. Our expectation is that these improvements to ENVS programming will increase attainment of student learning outcomes 1 and 4. It is also worth noting that the value of the ENVS student

poster sessions associated with GIS and select other upper division classes is reflected in the high attainment scores for learning outcome 3.

Table 1. Scores on a 1-6 scale for student attainment of ENVS Program student learning outcomes.

Student Learning Outcome	Average Student Score
1	3.12
2	3.81
3	4.57
4	2.45
5	4.08
6	N/A

Student learning outcome 6 reflects a central tenant of the ENVS Program, which is to involve program students in hand-on research through working on faculty research projects and in internships at local resource agencies. The number of program students participating in research and internship opportunities is shown in Table 2.

Table 2. ENVS students participating in Directed Research and Internship Classes as well as working as Student Research Assistants for ENVS faculty for the previous three academic years.

Academic Year	14/15	15/16	16/17
Directed Research Students	6	3	4
Student Internships	2	3	2
Student Research Assistants	Not Available	12	9

ENVS students continue to be involved in a wide variety of local research projects and internships and student participation rates in these opportunities remain steady. We started tracking the number of students that work as Research Assistants in AY15-16. This category includes students working on faculty-led projects that do not receive either directed research (ENVS 498) or internship (ENVS 491) credits. Student projects with ENVS faculty covered a wide variety of topics and developed skills that will benefit students looking to attend graduate school and get jobs in the environmental science field. Student projects included: analysis of trends in streamflow for glacier-fed rivers (Avery Stewart), a study on the terminus dynamics of the Le Conte glacier (Mo Michels), a study on black carbon deposition on the Mendenhall Glacier (Abby Nathlich), and a study on concentrations of organic pollutants in marine mammal tissues in southeast Alaska (Jacob Eberhardt). The projects are largely supported by faculty

grants as well as through UAS URECA awards. ENVS faculty continue to be successful in bringing in external funds from a variety of state and federal agencies so we expect that students will continue to have ample opportunities to participate in research.

4. Additional Program Information

Curriculum Updates

The ENVS Degree was restructured during 2015-2016, with changes going into effect in the 2016-2017 academic year. Student feedback on the changes was positive, particularly with regard to the increased flexibility that students have to design a degree that fits their interests and goals.

In the area of course offerings, ENVS faculty Brian Buma and Sonia Nagorski finalized new courses in Sustainable Resource Management (Buma) and Geological Resources and the Environment (Nagorski) through curriculum committee. Buma also offered a "Maymester" field class in Forest Field Ecology.

Exit Interview Information

This was the second year that we sent exit surveys to program graduates. We received two surveys back from program graduates.

The student both commented on the benefit of small classes and the opportunity to form personal relationships with professors was one of the biggest benefits of the ENVS Program at UAS. Both responders spoke to the value of their directed research and internship opportunities, in particular because it allowed them to see what is involved in designing and carrying out a scientific research project. The students also appreciated the hand-on field opportunities that were available through program classes. In terms of constructive feedback, the students noted several specific areas of improvement:

1) For the second year in a row we received feedback that the program could serve students better by exposing them to environmental career options in the region.
2) Students felt that, because of the small size of the program and the limited number of class offerings, it was critical to have a good advising structure in place so that students get their courses sequenced correctly and do not miss required classes that are not offered every year

In addition, as mentioned previously, we have redesigned the capstone seminar (ENVS 492) for AY17-18 to provide students with exposure career opportunities in the Environmental Sciences. This seminar will involve having professionals from fields like environmental engineering, environmental consulting, and resource management interact closely with students and share aspects of their background, training, interests, and daily work environment.

Program Issues and Updates

Program space issues were addressed at the end of the academic year when ENVS faculty were able to move into a new office cluster in the Whitehead building. Having co-located offices has been a great boon to the program because it allows facilitates far more faculty interaction and increases the level of faculty coordination, which directly benefits students. In addition, new classrooms on the ground floor of the Whitehead building provide dedicated classroom space as well as ample storage space for lab and field supplies. The program would still benefit by having research lab space co-located with faculty office. As it stands, ENVS faculty have research gear and analytical instruments in both the Natural Science Research Lab (NSRL, 1 mile from campus) and in the USFS Juneau Forestry Science Lab (located on campus). The FSL lab is relatively convenient, however it is challenging to work with ENVS students in this lab because of the tight restrictions on access to USFS facilities.

ENVS program faculty continue to have success procuring external funding, with large awards from NSF and NOAA. In addition to supporting undergraduate student research, this external funding requires dedicated space for research technicians and postdoctoral scholars. Currently most of these people are housed in NSRL, which minimizes interaction with program students. The off campus location of the research labs is also an issue for undergraduate students, many of whom do not have cars.

From a faculty standpoint, we are fully staffed and able to cover all of our program classes without the use of term or adjunct faculty. We continue to add classes and are looking at developing new field research classes for students that can be done in May immediately after the end of school. The program still suffers from low enrollments in some upper division classes despite relatively high enrollments in lower division classes. The enrollment issue highlights the importance of increasing recruitment of high caliber students that can successfully complete the rigorous ENVS degree.