

Bachelor of Arts Biology Bachelor of Science Biology Bachelor of Science Marine Biology Bachelor of Science Fisheries and Ocean Sciences with a Concentration in Fisheries Science Annual Assessment Report for AY2021 March 1, 2022

### **Program Overview**

The cluster of biology programs includes a B.S. degree in Biology, a B.A. degree in Biology, a B.S. degree in Fisheries and Ocean Sciences with a Concentration in Fisheries Science that is jointly offered with UAF, pre-major programs for all of the above, a minor in Biology, and a concentration in Fisheries Science available to the first three of the aforementioned bachelor programs. The location of the University provides students with a "natural laboratory" that includes extensive marine habitat, rainforest, streams, lakes, wetlands, and ice fields all within walking or short driving distance of the classrooms. A small student-to-professor ratio ensures a more personal approach to learning than is possible at larger universities. Information about our degrees is found at http://www.uas.alaska.edu/artssciences/biology/index.html.

The B.S. in Marine Biology was instituted in AY05 in support of the university's goal of being the premier in-state campus for marine science undergraduate programs. The B.A. in Biology was added in AY08 to provide a greater opportunity for students interested in a biology degree with a liberal arts focus. The B.A. degree is ideal for students with goals towards teaching in middle-school and secondary-schools and require a content degree in addition to broad training in liberal arts and sciences. The B.A. in Biology was derived from the B.S. in Biology program and no new courses were required to implement the program. The B.S. degree in Fisheries and Ocean Sciences and the Concentration in Fisheries commenced in AY18.

<u>B.S. Degree – Biology</u>: The Bachelor of Science degree in Biology provides students the opportunity to learn biological principles and skills in lecture, laboratory, and field courses. Student research is emphasized throughout the program. Program faculty are actively involved in a wide range of disciplines, including biological and fisheries oceanography, marine ecology, behavioral ecology, evolution, marine mammalogy, invertebrate physiology, and pollution biology. The Bachelor of Science program in biology comprises a core curriculum generally found nationwide in Bachelor of Science biology programs.

<u>B.S. Degree – Marine Biology</u>: The B.S. degree in Marine Biology provides students with the opportunity to learn biological principles and skills in lecture, laboratory and field courses with a core curriculum in marine biology. Student research is emphasized throughout the program. The program

has faculty actively involved in a wide range of disciplines described above. The Marine Biology B.S is enhanced by the onsite flow-through seawater system located on the main campus, and intertidal field sites for students directly behind the teaching lab. There are few campuses that can boast of the connection between a marine laboratory and the main campus!

## B.S. Degree – Fisheries and Ocean Science with a Concentration in Fisheries:

The UAS-UAF Joint B.S. degree in Fisheries and Ocean Sciences with a concentration in Fisheries Sciences (Fisheries B.S.) provides students with the opportunity to learn fisheries and ocean sciences and skills in lecture, laboratory and field courses with a core curriculum in fisheries science across the two campuses. Student internships in fisheries industries and fisheries science research is emphasized throughout the program. Students enjoy designing their upper-division elective coursework from many options offered through UAS Natural Sciences and UAF College of Fisheries and Ocean Sciences. The program has faculty actively involved in a wide range of disciplines described above. The Fisheries B.S is enhanced by the onsite flow-through seawater system located on the main campus, and intertidal and subtidal field sites for students directly behind the teaching lab. There are few campuses that can boast of the connection between a marine laboratory and the main campus!

<u>*B.A. Degree – Biology*</u>: The B.A. degree in Biology provides students with the opportunity to learn biological principles and skills in lecture, laboratory and field courses with a breadth in liberal arts and sciences.

<u>Biology Minor</u>: This minor is designed to provide students with a broad introduction to the discipline of biology as well as the opportunity for advanced study in three focus areas.

*Fisheries Science Concentration*: This concentration is designed for students in one of the cluster of biology programs to gain a broad introduction to the biology, assessment, and management of fish populations harvested for human consumption, in preparation for a career in the fisheries of Alaska and elsewhere.

# **Program Student Learning Outcomes**

The following program student learning outcomes are based on our Program Assessment Plan that was finalized in fall 2017. The student learning outcomes are common to all four degree programs. Program Student Learning Outcomes (SLOs)

- 1) Students will gain a broad background in biological sciences.
- 2) Students will develop critical thinking skills.
- 3) Students will improve oral and written scientific communication skills.
- 4) Students will gain practical experiences in basic biological research.

# Method of Data Collection on Program SLOs

<u>SLO 1: Broad Background in Biological Sciences</u>: Students will demonstrate a broad knowledge of biology including chemical principles, cellular metabolisms, organismal diversity, principles of genetics and evolution

1.1) We report on the percentage of students who passed (earned a C or better) the first (BIOL 115) and second (BIOL 116) semester of the Fundamentals of Biology two course series. We compare this across years.

1.2) We examine the distribution of grades in one lower-division required course (BIOL S271) and one upper-division required course (BIOL S362) to determine the percentage of students who pass with a C or better. We compare this across years.

<u>SLO 2: Develop Critical Thinking Skills</u>. Students will demonstrate that they can use an empirical approach to evaluate a biological phenomenon using the primary literature.

2.1) We assess the percentage of students in a lower division course (BIOL S271) who receive a C, B, or A on their written research report. We compare these data to those obtained from two upper division courses (BIOL S362 and BIOL S384).

2.2) We assess the proportion of students earning a C or better for the portion of the grade based on the primary literature (e.g., discussion grade, written research paper) in one lower-division course (BIOL S110) and two upper-division courses (BIOL S311, S380).

2.3) We assess the percentage of students in a lower division course (BIOL S271) who earn a C, B, or A on their written report that requires them to use the scientific method to solve scientific problems in the field and lab. We compare these data to those obtained from an upper division course (BIOL S362).

<u>SLO 3: Oral & Written Scientific Communication Skills</u>. Students will demonstrate that they are able to represent and communicate biological information.

3.1) We assess the percentage of students in a lower division course (BIOL S215) who receive a C, B, or A on their oral presentation. We compare these data to that obtained from an upper division course (BIOL S384).

3.2) We assess the percentage of students in a lower division course (BIOL S115) who earn a C, B, or A on their written research paper. We compare these data to that obtained from an upper division course (BIOL S380).

3.3) We assess the percentage of students in a lower division course (CHEM S105) who earn a C, B, or A on their written lab notebook. We compare these data to that obtained from an upper division course (CHEM S341).

<u>SLO 4: Students will gain practical experiences in basic biological research</u>. Students will demonstrate their knowledge of techniques and skills gained in the biological sciences.

4.1) We assess the percentage of students who receive a C, B, or A on the laboratory practical in a lower division course (BIOL 116) and an upper-division course (CHEM 342).

**Data Collected on Program SLOs for AY21** The following program student learning outcomes data summary table is based on our Program Assessment Plan that was finalized in Fall 2017, and includes data for AY21.

SLO	Course	Metric	%
1.1	BIOL S115	% students who earned a C or better	72%
1.1	BIOL S116	% students who earned a C or better	95%
1.2	BIOL S271	% students earning a C or better	86%
1.2	BIOL S362	% of students earning a C or better	94%
2.1	BIOL S271	% students earning a C or better on their written research report	86%
2.1	BIOL S362	% students earning a C or better on their written research report	94%
2.1	BIOL S384	% students earning a C or better on their written research report	89%
2.2	BIOL S110	% of students earning a C or better for the portion of the grade based on the primary literature (discussion grade)	75%
2.2	BIOL S380	% of students earning a C or better for the portion of the grade based on the primary literature (discussion grade)	88%
2.2	BIOL S311	% of students earning a C or better for the portion of the grade based on the primary literature (written research paper)	100%
2.3	BIOL S271	% of students earning a C or better on their written report that requires them to use the scientific method to solve scientific problems in the field and lab.	86%
2.3	BIOL S362	% of students earning a C or better on their written report that requires them to use the scientific method to solve scientific problems in the field and lab.	94%
3.1	BIOL S215	% of students earning a C or better on their oral presentation.	100%
3.1	BIOL S384	% of students earning a C or better on their oral presentation.	100%
3.2	BIOL S115	% students earning a C or better on their written research report	79%

3.2	BIOL S380	% students earning a C or better on their written research report	92%
3.3	CHEM S105	% of students earning a C or better on their written lab notebook	92%
3.3	CHEM S341	% of students earning a C or better on their written lab notebook	100%
3.3	CHEM S342	% of students earning a C or better on their written lab notebook	92%
4.1	BIOL S116	% of students earning a C or better on the laboratory practical	81%
4.1	CHEM S342	% of students earning a C or better on the laboratory practical	92%

### **Evaluation of the Data Collected on Program SLOs for AY19**

On average, 90% of students achieved the SLO's for the Biology, Marine Biology, and Fisheries programs. While this is a slight decrease from AY20 (94%), it still strongly indicates that our program is effective at meeting the SLO's outlined in this plan. Students performed well on nearly all SLOs assessed but were somewhat weaker on SLOs 2.2 and 3.2 in lower-division courses related to scientific oral communication and writing skills, respectively. Importantly, however, there was improvement in these same SLOs in the upper-division courses (SLO 2.2 75% vs. 88%, SLO 3.2 79% vs. 92%), indicating academic growth in our students through time. Similarly, there was strong improvement in achieving SLO 1.1 between the first (BIOL S115, 72%) and second (BIOL S116, 95%) second semester introductory biology course, and SLO 1.2 between the lower-division (BIOL S271, 86%) and upper-division (BIOL S362, 94%) course, again indicating continued academic growth in our students. Finally, we note that these SLOs do not include BIOL S498, where upper-division students gain most of their practical skills through internships and independent research.

### **Student Exit Interviews**

We typically distribute exit interviews to our graduating seniors each spring. Due to the loss of the faculty member (Susan Kendig) in AY21 that typically distributed these interviews, and on-going challenges to due to the COVID-19 pandemic, the interviews were not distributed in AY21. We will make a concerted effort to distribute the interviews in AY22.

### **Biology Advisory Committee**

We typically hold a Biology Advisory Committee meeting each Spring, to discuss annual program assessment, modifications of the curriculum, and student opportunities. The BAC is comprised of biology professionals in Juneau from UAF, state, and federal agencies. Due to on-going challenges due to the COVID-19 pandemic, the BAC did not meet in AY21; however, we will make a concerted effort to meet in AY22.

#### **Future Plans to Improve Student Learning**

Faculty have discussed ways in which SLOs can be improved. One of the more successful strategies for this has been the receipt of curriculum development and academic innovation funds to increase the proportion of active learning and locally based lab activities in our courses. We will continue to apply for such funds.

We know from student discussions that students who engage in research (independent or directed) are more engaged in biology. In response to this, David Tallmon proposed, developed and organized a freshman course (BIOL S108: Ecology of Southeast Alaska: Experiential Learning) in which students gain skills in time management, note taking, reading primary literature, and will be introduced to all Biology faculty and their research projects. This was delivered for the time to students in Fall 2019 and has consistently received positive feedback from the students. All Biology faculty have participated in this course by leading weekend research activities, finding it overall to be a positive experience with freshmen in field and laboratory settings. This experience helps to 'break the ice' for students meeting and working with faculty, and our hope is that they become more engaged in faculty research projects as a result. Importantly, our data so far indicate that this course has positively impacted student success and retention in our programs. From 2018 to 2020, 100% of students who took both BIOL S108 and BIOL S115 passed BIOL S115 and were still enrolled at UAS the following semester. Typically, only about 75% of students pass BIOL S115 and are retained to the next semester.

We have determined that many of our students do not form study groups in their classes and we are testing ways to encourage participation in study groups. Assigning students to study groups (e.g., in BIOL S115), has not proven to be effective or successful. It is our experience that study groups are more successful if initiated by the students. To this end, the co-location of biology students in Anderson adjacent to Biology faculty offices provides positive student and student/faculty interactions. Students study in the "Fish Bowl" and so far this has been the most beneficial mechanism for fostering positive study habits. Faculty frequently discuss study skills with students, both in class and during advising sessions, and study groups are encouraged. This level of face-to-face engagement has been halted during the pandemic but we are looking forward to this resuming when it is safe.

We are particularly proud of our Marine Biology BS Program being ranked #8 in the country by College Magazine in 2018, and glad to hear that our efforts in delivering a quality program are being recognized. We are also pleased with the recent statewide focus by President Pitney, the Board of Regents, and others on enhancing fisheries, marine, and ocean sciences in Juneau. We are excited to showcase and continue to strengthen our unique programs that are built upon our one-of-a-kind location near the sea in Southeast Alaska.