

UNIVERSITY OF ALASKA SOUTHEAST SITKA



Fisheries Technology

Fisheries Technology Assessment Report

**Academic Year
2015 - 2016**

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University of Alaska Southeast (UAS) Fisheries Technology program (Fish Tech)
Assessment of Student Learning Outcomes (SLO) Report for Academic Year (AY)
2015-2016.

1. Program Overview

The Fisheries Technology Program (FT) Associates of Applied Sciences (AAS) is the only two-year, entry-level academic program in fisheries in the UA system. The mission of the FT program is to provide students with a broad educational and practical foundation in the field of fisheries technology. Students will be prepared for entry level employment in federal or state agencies, private-non-profit salmon enhancement facilities (PNPs), and various private fisheries sectors. Students will also be prepared to progress from the two-year degree to related four year degrees should they choose to continue on academic pathways. The goal is for program graduates to fill high demand fisheries jobs in Alaska or pursue a Bachelor's degree in a fisheries related field.

This Assessment plan is for the Fisheries Technology AAS, the two Certificates (Alaska Salmon Enhancement, Fisheries Management) and the two Occupational Endorsements (Alaska Salmon Enhancement, Fisheries Management).

2. Program Student Learning Outcomes

Student learning goals and UAS competencies

Goal 1. Students will demonstrate sound knowledge of fish and their habitats (UAS competencies in information literacy and critical thinking).

Goal 2. Students will have sound field sampling techniques (UAS competencies in quantitative skills, critical thinking, computer usage and communication).

Goal 3. Students will operate safely while participating in program activities and utilizing program equipment (UAS competency in professional behavior).

Goal 4. Students will understand the basic principles of salmon enhancement techniques used in Alaskan hatcheries (UAS competencies in quantitative skills and critical thinking).

Goal 5. Students will understand the management and legal frameworks within which marine fisheries exist (UAS competencies in communication, information literacy

and computer usage).

Student Outcomes

Goal 1. Students will describe ecological attributes of fish and their habitats.

Outcome 1.1. Students will identify common commercial species of Alaska and understand their habitat needs.

Outcome 1.2. Students will describe water as an environment for life.

Outcome 1.3. Students will convey fishery information to faculty and classmates.

Goal 2. Students will demonstrate sound field sampling techniques.

Outcome 2.1. Students will collect, analyze, and present fisheries data utilizing standard methodologies.

Outcome 2.2. Students will describe the importance of following protocols and techniques; utilizing good field data collection techniques and data recording techniques.

Outcome 2.3. Students will describe methodologies and protocols; practice good data management skills; summarize and communicate findings.

Outcome 2.4. Students will discuss the importance of correct data collection and analysis.

Goal 3. Students will operate safely while participating in program activities and utilizing program equipment.

Outcome 3.1. Students will identify methods for reducing injury in the field and lab setting.

Outcome 3.2. Students will discuss safe operating procedures for equipment; assess field conditions to determine safety guidelines to follow.

Outcome 3.3. Students will discuss the importance of promoting safety for self and others and equipment.

Goal 4. Students will describe the basic principles of salmon enhancement techniques used in Alaskan hatcheries.

Outcome 4.1. Students will describe the basic process involved in fish rearing.

Outcome 4.2. Students will take part in “hands-on” procedures to ensure successful output of fish.

Outcome 4.3. Students will describe attributes of Salmon Culture facilities in Alaska.

Goal 5. Students will describe management and legal frameworks within which marine fisheries exist.

Outcome 5.1. Students will describe the legal and regulatory framework of marine fisheries in Alaska.

Outcome 5.2. Students will describe the current status of marine fisheries statewide.

Outcome 5.3. Students will describe the social and economic value of Alaska fisheries to the state and nation.

3. How data are collected on Student Learning Outcomes

The Fish Tech program has only recently solidified Student Learning Outcomes (SLOs), that are hierarchically nested from the individual lesson, to the course, to the program level. In fall 2014, we established the SLOs for each of our core courses in accordance with a university-wide effort through the UAS Undergraduate Curriculum Committee. In fall 2016, we established SLOs for each lesson/module of each of our courses and began making those SLOs available to students via course syllabi. Also in fall 2016, we established the Fish Tech Annual Assessment document that outlines the results presented here. As the review period outlined here encompasses AY15-16, and the aforementioned Assessment document was only recently created, the results presented here will be limited and discuss ‘student success’ as a proxy for meeting SLOs. That being said, in spring of 2015 and fall of 2016, the Fish Tech program did have several opportunities to track student success. During this period, the primary means to track student success was course participation, assignment completion and exam scores reviewed by individual faculty members. At the completion of each semester, Fish Tech faculty met to talk about Student Evaluations to identify the strengths and weaknesses of each course and discuss changes for the future. In fall 2016 the Fish Tech program underwent Program Review which also highlighted student successes using data from the UAS Institutional Effectiveness program.

4. Data Collected on Student Learning Outcomes during the 2015-2016 academic year

In end of semester meetings among Fish Tech faculty held in May 2016, several strengths and weakness were outlined in the context of student learning and student course evaluations.

Fish Tech program strengths:

- The FT program is the only two-year entry level fisheries degree in the entire UA system
- Increased student enrollment, outreach and teaching classes in rural communities (which is important but not for a general fund request)
- The program is meeting the objective of producing well trained workers for industry sectors such as PNP enhancement organizations and fisheries management agencies
- Serving needs of individuals who do not want a degree but want specific education in the field

Fish Tech program weaknesses:

- Lack of an AS degree option for the FT curriculum to allow for easier transition from two-year to four-year programs
- Lack of articulation to any four-year programs at UAS
- Low graduation (completion) rate that may be explained by part time nature of

- students, field seasons overlapping with fall semester and the newness of program and rapid increase of enrolled students (who would not yet be eligible to graduate)
- A large industry sector live and work at remote hatcheries and perhaps cannot access internet based classes or cannot commit to the semester schedule – identifies a need to alter or adapt delivery methods and schedules
 - Need to identify future sources of student travel funds when USDA grant expires.

In AY15-16, the Fish Tech program underwent Program Review as outlined by the UAS Provost office and the Board of Regents – Academic Review Policy (P10.06.010). As part of this review, the Fish Tech program was asked to analyze its contribution to student success in terms of graduating quality students that might serve in Alaska's job markets. As the Fish Tech program falls under the School of Career Education, most of the program and course SLOs are focused on job related skills and education. In the fall of 2015, 14% of students surveyed held positions in fisheries enhancement, management, and research. However, 81% of students surveyed claimed they were actively seeking a job in fisheries technology and would relocate for the position. These numbers continue to match labor trends, with the State of Alaska having listed fisheries related employment as high demand within the state. In AY15-16, 29 AAS, certificate and/or Occupational Endorsements were conferred to Fish Tech students (Appendix A). Retention of students through at least one of the programs has increased to approximately 60%, with 2/3 of those graduates have gainful employment in the fisheries sector and at least five of those students are seeking advanced degree programs.

5. Data Evaluation of Student Learning Outcomes from the previous academic year

In AY2014-2015, evaluation of SLOs was extremely limited as only the course level SLOs were outlined at that point. In AY2014-2015, 12 AAS, certificate and/or Occupational Endorsements were conferred to Fish Tech students (Appendix A).

6. Future Plans to Improve Student Learning

As a result of the end of year strengths and weakness meeting among the Fish Tech program the following have been done or are in process of being done:

- Worked with UAS Natural Sciences faculty to re-work the UAS AS degree to include Fish Tech coursework and allow students a pathway to a four-year program
- Developed six asynchronous courses that are delivered on university supplied Apple iPads for students that have poor internet connectivity or cannot meet during a traditional semester.
- Have received funding from the Department of Labor and At-sea Processors Association to develop expedited programming (Occupational Endorsements) for non-traditional students and financial aid and accessibility for traditional high school students.

As a result of increased efforts in tracking student learning, the Fish Tech program has taken the following steps for future tracking of student achievement:

- Completed Quality Matters training through UAA that will ensure that course offerings are meeting student needs and apply to SLOs listed
- Developed Detailed Course Objectives summary for each of the Fish Tech core courses that includes a course description, all of the course-level SLOs, all of the lesson/module level SLOs and the time for each. (Appendix B)
- Developed pre and post assessments for each of the courses to determine student retention and progression over each course
- Developed an end of course survey that allow students to provide feedback to content, technology and effort.
- Developed a program that tracks students after they complete their terminal degree to determine if they are working in the fisheries industry.
- Developed exam questions for each class that directly link to lesson/module SLO which address course and program level SLOs.

Appendix A. Fish Tech graduates

AY2015-2016 (29 degrees conferred; GPA in parentheses)

Tracey Nuzzi	Certificate – Fisheries Management (3.88)
Iris Fletcher	Occupational Endorsement – Fisheries Management (4.0)
Krissa Davis	AAS in Fisheries Technology (3.65)
Krissa Davis	Certificate – Fish Culture
Krissa Davis	Certificate – Fisheries Management
Krissa Davis	Occupational Endorsement – Alaska Salmon Enhancement
Krissa Davis	Occupational Endorsement – Fisheries Management
Autumn Redmond	AAS in Fisheries Technology (3.34)
Autumn Redmond	Certificate – Fish Culture
Autumn Redmond	Certificate – Fisheries Management
Autumn Redmond	Occupational Endorsement – Alaska Salmon Enhancement
Autumn Redmond	Occupational Endorsement – Fisheries Management
Maureen Blair	AAS in Fisheries Technology (3.61)
Maureen Blair	Certificate – Fish Culture
Maureen Blair	Certificate – Fisheries Management
Maureen Blair	Occupational Endorsement – Alaska Salmon Enhancement
Maureen Blair	Occupational Endorsement – Fisheries Management
Peter Amylon	Occupational Endorsement – Alaska Salmon Enhancement (3.16)
Peter Amylon	Occupational Endorsement – Fisheries Management
Gavin Blood	Occupational Endorsement – Alaska Salmon Enhancement (2.65)
Bill Burke	Occupational Endorsement – Alaska Salmon Enhancement (3.38)
Iris Fletcher	Occupational Endorsement – Alaska Salmon Enhancement (4.0)
Peter Forstner	Occupational Endorsement – Fisheries Management (4.0)
Sawyer Link	Occupational Endorsement – Alaska Salmon Enhancement (3.85)
Sawyer Link	Occupational Endorsement – Fisheries Management
Bryan Tolle	Occupational Endorsement – Alaska Salmon Enhancement (2.83)
Bryan Tolle	Occupational Endorsement – Fisheries Management
Maggie Wright	Occupational Endorsement – Fisheries Management (3.97)
Lauren Bailey	Occupational Endorsement – Alaska Salmon Enhancement (3.76)

AY2014-2015 (12 degrees conferred)

Clayton Hamilton	Certificate – Fish Culture
Clayton Hamilton	Certificate – Fisheries Management
Clayton Hamilton	Occupational Endorsement – Fisheries Management (3.37)
Madalyn Campbell	AAS in Fisheries Technology (2.99)
Madalyn Campbell	Certificate – Fish Culture
Madalyn Campbell	Certificate – Fisheries Management
Madalyn Campbell	Occupational Endorsement – Fisheries Management
Miranda Green	Occupational Endorsement – Fisheries Management (3.59)
Miranda Green	Certificate – Fish Culture
Miranda Green	Certificate – Fisheries Management
Richard Shafran	Occupational Endorsement – Fisheries Management (4.0)

Appendix B. Example Detailed Course Objective Summary

Course title: FT 274 Fisheries Biology (3cr)

Course description: An introduction to the major groups of fishes with particular emphasis on fishes of the Pacific Northwest region of North America. Introduces students to finfish and shellfish. Identification and classification, anatomy and physiology, age and growth, reproduction and behavior will be studied. Emphasis will be placed on commercially important fish species of Alaska.

Course Learning Outcomes (Modules that address CLOs)

1. Describe how fish swim and regulate physiology with the environment (Module1, Module2, Module4, Module7)
2. Describe how we classify fish (Module3)
3. Describe how fish breathe (Module5)
4. Describe how fish grow and reproduce (Module8, Module9)
5. Describe how fish interact with the environment (Module10, Module11)
6. Describe the biology and fisheries ecology of invertebrates in Alaska (Module12)

<u>Module and Student Learning Objectives (SLOs)</u>	<u>Module time: (hr:min)</u>
<u>Module 1:</u> How to use iPads and elearning modules	<u>Module time:</u> (00:19)
<u>Module 2:</u> Class Introduction - Fisheries Biology	<u>Module time:</u> (01:12)
<u>Student Learning Objective (SLO)</u>	<u>Time (min)</u>
1. Describe the basic objectives and grading scheme of this course	(07)
2. Describe your instructor . . . without using any bad words!	(09)
3. Describe what makes saltwater unique for fish	(15)
4. Describe where fish live	(17)
5. Describe the general subjects covered in this course	(22)
<u>Module 3:</u> Fish Systematics, Genetics, Speciation	<u>Module time:</u> (01:31)
<u>Student Learning Objective</u>	<u>Time (min)</u>
1. Define the general terms about systematics of fish.	(04)
2. List the five methods of categorizing fish groups.	(09)
3. Describe how species evolve via allopatric and sympatric speciation.	(11)
4. Describe the early stages for fish evolution.	(09)
5. Describe major characteristics of the “Jawless” fish - Agnathans (Lamprey and Hagfish).	(13)
6. Define the major groups that make up the “Jawed” fish and give details about each group.	(20)
7. Describe general characteristics and the two main groups of the Bony Fish.	(03)
8. Describe major characteristics of the “Lobe-Finned” fish.	(08)
9. Describe major characteristics of the ”Ray-Finned” fish	(09)
10. Describe major characteristics of the Teleosts.	(04)
<u>Module 4:</u> Fish Structure (form) and Function	<u>Module time:</u> (01:19)
<u>Student Learning Objective</u>	<u>Time (min)</u>
1. Describe the eight basic categories of fish body shape.	(18)
2. Describe the six basic body plans of fish swimming.	(14)
3. Differentiate the four different types of scales and which belong to which fish.	(07)
4. Describe the purpose of each fish fin and how fins play an important role in fish ecology.	(17)
5. Describe the function of the skeleton, spines and head.	(05)

6. Describe how the eyes, mouth and gills can explain fish ecological traits. (06)
 7. Differentiate the function of white vs. red muscle. (06)
 8. Describe three different types of swimming. (05)

Module 5: Respiratory and Circulation	Module time: (00:51)
Student Learning Objective	Time (min)
1. Describe the anatomy and function of the fish gill.	(07)
2. Describe the two types of gill ventilation and describe how fish extract oxygen from the water.	(05)
3. Describe the other ways that fish can breathe other than using gills.	(10)
4. Describe the bodily processes that depend on oxygen extraction.	(03)
5. Name four different things that can determine how much oxygen a fish will need.	(05)
6. Describe fish blood and cells and differentiate from our blood.	(11)
7. Define oxygen affinity, Bohr effect, Root effect, P50 and PCO ₂ .	(05)
8. Explain circulatory control in fish (heart structure and type of circulation).	(05)

Module 6: Exam 1

Module 7: Buoyancy, Thermoregulation and Balance	Module time: (01:15)
Student Learning Objective	Time (min)
1. Describe the four ways that a fish can achieve neutral buoyancy.	(14)
2. Differentiate physostomus and physoclistous gas exchange and describe how they work.	(11)
3. Describe the role of the rete mirabile and issues with dumping air quickly on ascents.	(04)
4. Describe the two ways fish can alter their internal temperature and be able to discuss what regional endothermy is.	(08)
5. Describe the challenges associated with fresh and saltwater fish in relation to osmosis and ion regulation.	(14)
6. Describe how each of the three main fish groups deal with osmotic issues.	(06)
7. Describe how each of the three main fish groups deal with ionic issues and detail the changes of diadromous and euryhaline Teleosts.	(06)
8. Describe what kind of stressors fish can face and how they deal with them.	(11)

Module 8: Feeding and Growth	Module time: (01:40)
Student Learning Objective	
Time (min)	
1. Define the basic terms associated with fish feeding habits and food selectivity.	(03)
2. Describe the relationship between gut length and fish diet and define the role of the pyloric caeca.	(09)
3. Describe the three basic types of fish feeding.	(14)
4. Describe the different mouth types and associate feeding.	(04)
5. Describe the differences in gill rakers for different types of feeding.	(06)
6. Describe three basic requirements of fish nutrition.	(05)
7. Describe three basic requirements of fish nutrition.	(19)
8. Describe the major factors that affect fish growth.	(23)
9. Describe the four ways we measure fish growth.	(16)

Module 9: Reproduction	Module time: (01:26)
Student Learning Objective	Time (min)
1. Define the basic terms associated with reproduction and differentiate male and female sex organs in each of the three major fish groups.	(11)
2. Define sexual dimorphism and dichromatism and give examples of each.	(07)
3. Describe the Non-Guarder reproductive class and give examples.	(09)
4. Describe the Guarder reproductive class and give examples.	(08)

5. Describe the Bearer reproductive class and give examples. (06)
 6. Differentiate the three main modes of reproduction in fish. (08)
 7. Differentiate the main four mating systems in fish. (07)
 8. Describe what r vs K selection means and how it relates to fish age, number of offspring, frequency of breeding, etc. (06)
 9. Describe the five major developmental stages for fish. (05)
 10. Differentiate direct and indirect development in fish and describe the role the environment may play. (05)
 11. Describe the five factors that contribute to the variation in fish development. (06)
 12. Differentiate the three alternative reproductive strategies and give examples of each. (05)
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Module 10: Exam 2

- Module 11: Sensory Perception, Behavior and Communication Module time: (01:49) Time (min)
Student Learning Objective
1. Describe how water impacts vision, sound and smell for fish. (13)
 2. Define olfaction for fish and describe the organs responsible. (07)
 3. Define gustation for fish and describe the organs responsible. (08)
 4. Describe how a fish hears. (14)
 5. Describe how the lateral line in fish works. (07)
 6. Describe how fish see. (11)
 7. Describe the theory of optimal foraging and how it applies to fish. (29)
 8. Differentiate a fish school from a shoal and describe the purpose of each. (20)
 9. Describe the role of rheotaxis, electroreception, and magnetoreception. (06)
 10. Describe the 8 color patterns in fish. (12)
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- Module 12: Introduction To Fish Ecology Module time: (00:56) Time (min)
Student Learning Objective
1. Define each of the ecological filters and sequence by order. (07)
 2. Define fundamental and ecological niche and discuss impacts for species richness. (06)
 3. Define food webs and discuss their importance in the ecosystem. (09)
 4. Define and give examples of keystone species. (08)
 5. Define top-down and bottom-up interspecific and intraspecific interactions. (09)
 6. Define and give examples of character displacement, interference competition, exploitation competition, and habitat imprinting. (05)
 7. Define and give examples of symbioses, mutualisms, commensalisms, and parasitisms. (12)
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- Module 13: Invertebrates Module time: (01:14) Time (min)
Student Learning Objective
1. Describe the basic ecology of arthropods and describe each of the groups. (23)
 2. Describe the major arthropod fisheries in Alaska. (11)
 3. Describe the basic ecology of molluscs. (13)
 4. Describe each of the mollusc groups and the fisheries. (08)
 5. Describe the basic ecology of echinoderms and describe each of the groups. (10)
 6. Describe the echinoderm fisheries in Alaska. (04)
 7. Describe the diversity of nudibranchs. (03)
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Module 14: Exam 3
