

FISH 414

Field Methods in Marine Ecology & Fisheries

Maymester 2019

COURSE SYLLABUS

Scope of the Course:

A hands-on introduction to the methods used to study ecological patterns and processes in the marine environment. Class will consist of a series of group field exercises conducted in local marine habitats. These exercises will emphasize a variety of sampling methods for documenting patterns of distribution and abundance, experimental designs for testing hypotheses and statistical interpretation of results. These skills are fundamental to most basic and applied research in marine ecology and fisheries. Thus this course provides an essential foundation for a professional career in these areas. 3 credits (2 lecture credits = 1600 minutes and 1 lab credit = 2400 minutes)

Course prerequisite:

FISH F101, BIOL F371, or instructor approval

Location:

This course is taught in Juneau at the UAF Juneau Center of the School of Fisheries and Ocean Sciences. Lectures in Lena 101. Lab in Lena 105. Field activities will occur at various sites accessible from the Juneau road system.

Meeting time:

May 6 - 17, 2019

Exact meeting times will vary day-to-day depending on field activities. A typical day may begin at 600 and run until 1700.

Instructor:

Wendel Raymond

Office: 217 Lena

Office hours: by appointment

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Teaching Assistant:

Name Person

Office: Nicole LaRoche

Office hours: by appointment

Required Reading:

Krebs, Charles J. Ecological Methodology. 3rd edition in prep.

Chapters available online : <http://www.zoology.ubc.ca/~krebs/books.html>

Additional Reading Materials:

Will be made available through Blackboard <http://maymester-classes.uaf.edu> and the UAF library (electronic access).

Course Structure:

The course will consist of lectures, discussions, and labs. Attendance at all class meetings is mandatory.

Course Goal:

To introduce students to the methods used to survey populations and study ecological patterns and processes in the marine environment.

Learning Outcomes:

1. Develop knowledge of the basic principles and techniques of sampling biotic and abiotic factors in the marine environment, including:
 - a. Population estimation
 - i. Mark & recapture
 - ii. Quadrat & transect sampling
 - iii. Active vs. passive sampling
 - iv. Spatial pattern & indices of dispersion
 - b. Field care and handling of fish and shellfish
 - c. Abiotic factors to include water quality, temperature, salinity
 - d. Age and growth analysis
 - e. Condition and health indices
 - f. Lower trophic level sampling
 - g. Understand the proper care and use of laboratory equipment and field sampling gears used in marine ecosystems
2. Develop knowledge and provide practical experience in experimental design and statistical interpretation pertaining to marine ecology and fisheries, including
 - a. Sampling protocols required for collecting representative, non-biased fisheries and marine ecology data.
 - i. Replication, variability and power
 - ii. Data management
 - iii. Experimental Design
 - iv. Statistical interpretation
3. Develop critical thinking, written and oral communication, and professional skills relevant to marine ecology & fisheries, including
 - a. Communication of scientific results
 - b. Critical analysis & discussion of published scientific papers
 - c. Science ethics
 - d. Animal care use protocols

Evaluation:

Table 1. Distribution of points for grade calculation.

	Total points
DISCUSSION PARTICIPATION	50
LAB & CLASS PARTICIPATION	100
LAB NOTEBOOK	100
ASSIGNMENTS Assignments 1-2: 25 points each Assignments 3-5: 50 points each	250
EXAM	100
TOTAL	600

Grades will follow the following schedule:

≥90%A
≥80% and <90%B
≥70% and <80%C
≥60% and <70%D
<59.9%F

Table 2. Criteria used for evaluating participation. Arriving late or leaving early (without prior approval) will result in deduction of points.

Score	Criteria
100%	Actively engaged, provides insightful and thoughtful input, is well prepared, leads others in laboratory/field exercises, conducts laboratory exercises with care and attention to detail
90%	Engaged, speaks during discussion in a beneficial manner, is well prepared, conducts laboratory exercises with care and attention to detail
80%	Somewhat engaged, speaks a limited amount or provides comments that do not convey mastery of subject matter or that detract from the topic, adequately prepared, conducts laboratory exercises with moderate care and attention to detail
70%	Not so engaged, cannot address questions when called upon during discussion, not well prepared, conducts laboratory exercises with minimal care and attention to detail.
60%	Not engaged, silent during discussion, cannot address questions when called during discussion, conducts laboratory exercises only under duress
<60%	Non-participatory
0%	absent

Policies:

- Attendance: Students are expected to attend all classes and to fully participate in all individual and group assignments. Tardiness, leaving and re-entering during class, and exiting early are all disruptive for students and faculty alike. Make every effort to be prompt, to take care of personal business outside of class time, and to fully participate in all aspects of the class. Given the format of this course absences are not acceptable except in extreme circumstances.
- Classroom behavior: Students are expected to behave professionally at all times. Any type of behavior that is disruptive, distracting, or disrespectful to your fellow students, the instructor, or any guests will not be tolerated and will result in dismissal from the classroom and the student will be marked tardy. A second offense may result in a faculty initiated withdrawal from the class.
- Cell phones: Cell phones are permitted in the class as they are increasingly becoming useful field tools. However, cell phones should not distract from lectures, lab, and field activities.
- Plagiarism and cheating: Plagiarism is the overt or covert use of other people's work or ideas without acknowledgement of the source. This includes using ideas or data from a classmate or colleague without permission and acknowledgement, using sentences from journal articles in your writing without citing the author, or copying parts of a website into your written work. Plagiarism and cheating are serious offenses that violate the student code of conduct. They may result in an F grade in the course and/or referral to the University disciplinary committee.

Late Assignment Policy:

All assignments must be completed and handed in on the required date. Late assignments will be docked 10% by each day your work is late. Exceptions can be made only if discussed and approved well in advance of absence.

Student Protections and Services Statement:

Every qualified student is welcome in my classroom. As needed, I am happy to work with you, disability services, veterans' services, rural student services, etc., to find reasonable accommodations. Students at this university are protected against sexual harassment and discrimination (Title IX), and minors have additional protections. For more information on your rights as a student and the resources available to resolve problems, please go to the following site: www.uaf.edu/handbook/

Disabilities:

The Office of Disability Services implements the Americans with Disabilities Act (ADA), and insures that UAF students have equal access to the campus and course materials. The Course Instructors will work with the Office of Disabilities Services (203 WHIT, 474-7043) to provide reasonable accommodation to students with disabilities. Contact an Instructor or the Office of Disability Services for these services.

Required Readings (all posted on Blackboard course web site as pdf)

- Barange, M. (2003). Ecosystem science and the sustainable management of marine resources: from Rio to Johannesburg. *Frontiers in Ecology and the Environment*, 1(4), 190-196.
- Borer, E. T., Seabloom, E. W., Jones, M. B., & Schildhauer, M. (2009). Some simple guidelines for effective data management. *Bulletin of the Ecological Society of America*, 90(2), 205-214. doi: 10.1890/0012-9623-90.2.205
- Clark, J. E., S. Hinkley and T. Koeneman, 2002. Restratification of red king crab stock assessment areas in Southeast Alaska [in] Crabs in cold water regions: Biology, management, and economics. Alaska Sea Grant College Program AK-SG-02-01. pp 457-473.
- Dew, C. B., & Austring, R. G. (2007). Alaska red king crab: A relatively intractable target in a multispecies trawl survey of the eastern Bering Sea. *Fisheries Research*, 85(1-2), 165-173. doi: Doi 10.1016/J.Fishres.2007.02.001
- Lauth, R.R. (2011) Results of the 2010 Eastern and Northern Bering Sea Continental Shelf Bottom Trawl Survey of Groundfish and Invertebrate Fauna. NOAA Technical Memorandum NMFS-AFSC-227.
- Mueter, F. J., Broms, C., Drinkwater, K. F., Friedland, K. D., Hare, J. A., Hunt, G. L., . . . Taylor, M. (2009). Ecosystem responses to recent oceanographic variability in high-latitude Northern Hemisphere ecosystems. *Progress in Oceanography*, 81(1-4), 93-110. doi: Doi 10.1016/J.Pocean.2009.04.018
- Straley, J. M., Quinn, T. J., & Gabriele, C. M. (2009). Assessment of mark-recapture models to estimate the abundance of a humpback whale feeding aggregation in Southeast Alaska. *Journal of Biogeography*, 36(3), 427-438. doi:10.1111/J.1365-2699.2008.01906.X

Lecture/Discussion/Lab Schedule (subject to change)

Date	Lecture	Field	Lab	Reading	Discussion	Assignments	Low Tide	High Tide
Sun 5 th	1700 - 2000 Course Intro and field prep. Pizza provided!						-2.03 @ 0814	15.32 @ 2020
Mon 6 th	Data Management	0700 – 1030 Intertidal transect/quadrat Point Louisa	Lab: Excel data management	Krebs Ch 1, 4, 5 and Borer et al. 2009	Best practices for data management (Borer et al. 2009)	1) Analytical Skills	-2.38 @ 0849	15.14 @ 1507
Tue 7 th		0700 – 1100 Intertidal transect/quadrat Sunshine Cove		Krebs Ch 1, 4, 5	Analytical Skills	2) IACUC training	-2.34 @ 0927	14.69 @ 1548
Wed 8 th		0730 – 1130 Intertidal transect/quadrat Point Bridget		Krebs Ch 2 Straley et al. 2009	Mark and Recapture (Straley et al. 2009)		-1.93 @ 1009	14.04 @ 1633
Thu 9 th	Alaska fishery surveys and sampling design	0900 – 1200 Beach Seine Eagle River	Lab: Data analysis and graphing	Lauth 2011, p. 1-30	Alaska Fishery Surveys (Lauth 2011)		-1.19 @ 1056	13.32 @ 1726
Fri 10 th	Guest Lecture Siddon: Estimation of Abundance	0945 - 1230 Beach Seine Sunshine Cove	Work session: Data analysis and graphing				-0.29 @ 1152	12.77 @ 1831
Sat 11 th	Guest Lecture Pinchuk: Pelagic Sampling	Pelagic sampling	Lab: Phytoplankton Identification				0.54 @ 1257	14.11 @ 0610
Sun 12 th	Free day!						1.00 @ 1411	13.33 @ 0731
Mon 13 th						3) Beach seine project	1.01 @ 1523	13.23 @ 0858
Tue 14 th	Marking and Tagging and aging?			Clark et al. 2002, Dew & Austring 2007	Sampling Inefficiencies (Dew & Austring 2007)		0.72 @ 1627	13.77 @ 1014
Wed 15 th	Guest Lecture Donnellan/Rebert: Dive surveys and fishery quotas		Lab: Dive survey quota setting	Krebs Ch 7			0.42 @ 1722	14.55 @ 1118
Thu 16 th	Statistical Power			Barange 2003, Mueter et al. 2009	Ecosystem Based Management (Barange 2003, Mueter et al. 2009)		0.24 @ 1811	15.27 @ 1214
Fri 17 th	Final exam, course evaluations					4) Final Project 5) Notebooks	0.33 @ 1856	15.77 @ 1304