Syllabus for Arctic Marine Vertebrate Ecology (FISH 464) WINTER 2019

INSTRUCTOR:

Professor Kristin Laidre
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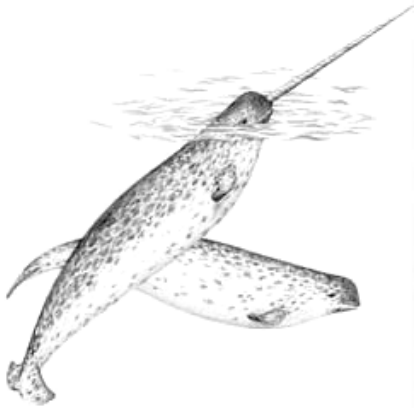

TEACHING ASSISTANTS:

Jenny Stern, SAFS graduate student
jhstern@uw.edu

Jessica Lindsay, SAFS graduate student
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CLASS HOURS:

Lecture Tues and Thurs 10:00-11:20, FISH 107
Discussion Thurs 1:30-2:50 (AA), 3:00-4:20 (AB), FSH 107

COURSE CREDITS: 4 credits

COURSE WEBSITE: https://canvas.uw.edu/courses/1256112

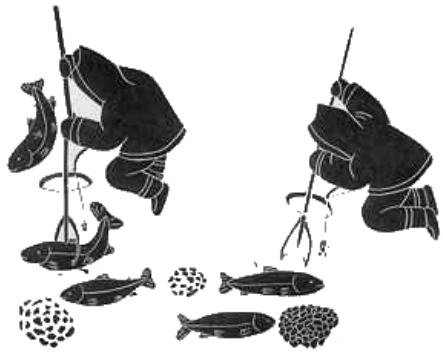
OFFICE HOURS:

Stern: Tuesday 11:30 am -12:30 pm, FSH 223 or by appointment
Lindsay: Wednesday 3:30-4:30pm, FSH 223 or by appointment
Dr. Laidre: By appointment

COURSE OBJECTIVES

The goals of this course are to convey an understanding of how Arctic marine ecosystems are structured and how they function, the challenges that various upper-trophic level marine organisms meet when living in the Arctic, how individuals adapt (looking at life-history parameters and reproductive strategies), and how populations are affected by physical changes in the Arctic environment. Emphasis will be on the complexity of Arctic marine ecosystems from primary producers to top predators, biomass, productivity, and biodiversity at different trophic levels, and the influence of sea ice as a forcing and shaping mechanism. Food chains and energy transport paths will be discussed. Simple fundamentals of population dynamics will be presented, like single species dynamics,

trophic interactions, and effects of environmental changes in time and space (climate change, habitat heterogeneity). The course will focus on several detailed case studies about various Arctic marine vertebrates, and the Arctic ecosystem will be compared to the Antarctic ecosystem. Finally, this course will touch on how all of this fits in as a background for better (or future) Arctic management and conservation policies given anthropogenic impacts.



LEARNING GOALS

1) Describe key properties and functions of the Arctic marine ecosystem, challenges and adaptations for Arctic species, and the impacts of climate change.
2) Synthesize new literature from scientific peer-reviewed journals (accomplished via writing assignments, and a final paper).
3) Interpret ecological trends in the Arctic by examining data and graphs in publications, and critically assess how impacts of climate change can be determined in the Arctic.
4) Gain skills in public speaking by presenting data syntheses in front of small groups, participating in group discussions about science topics.
5) Analyze peer-reviewed research in the context of a rapidly evolving field where fluency in current literature, terminology, and scientific concepts is a must.

PREREQUISITES

BIO 180 or equivalent.

COURSE MATERIALS

No required text. We will read selected articles from journals, books, and other published scientific literature. These will be available as PDFs through the course's website. For those especially interested in this subject, some suggested texts include the following (on reserve in the undergraduate library):

Thomas, D.N. 2017. Sea Ice Third Ed., Chichester, UK ; Hoboken, NJ: John Wiley & Sons, Ltd. ISBN 978-1-118-77838-8 (also available online via UW libraries)

Thomas, D. N., G. E. Fogg, P. Convey, C. H. Fritsen, J. –M. Gili, R. Gradinger, J. Laybourn-Parry, K. Reid, & D. W. H. Walton. 2008. The Biology of Polar Regions. Oxford University Press, Oxford UK. ISBN 978-0-19-929813-6

Thomas, D. N. 2004. Frozen Oceans: The floating world of pack ice. Firefly Books Ltd., Natural History Museum of London.

Stenseth, N. C., G. Ottersen, J. W. Hurrell, & A. Belgrano. 2004. Marine Ecosystems and Climate Variation: The North Atlantic a comparative perspective. Oxford University Press, Oxford UK.

Levin, S. (Ed). 2009. The Princeton guide to Ecology. Princeton University Press. ISBN 978-0691-12839-9 (also available online via UW libraries)

Sale, R. 2006. A complete guide to Arctic wildlife. Firefly Books, Buffalo NY. ISBN-13: 978-1-55407-178-4

GRADING BREAKDOWN

Midterm **(30%)** and Quizzes **(20%)** (testing knowledge of concepts, terminology, processes)
Short assignments and Participation in Discussion Section **(20%)** (testing ability to read and interpret peer-reviewed literature)
Final assignment **(30%)** (testing ability to do research, synthesize literature, write about a research topic in Arctic marine ecology)

METHOD OF INSTRUCTION

Lectures: This course will consist of two ~70-minute lectures per week. Lectures will emphasize main concepts, illustrated with examples from mostly marine ecosystems along with lectures from several experts.

Lectures will be primarily PowerPoint based and made available on the course website just before class (or after class in the case of guest speakers) for downloading and reviewing. Additional materials will include class discussions, films, discussion of current events, and questions. Material that is covered in class but not contained in PowerPoint presentations will be considered part of testable class content.

Discussion Section: Each week we will discuss 2-3 scientific papers in a small group. We may sometimes watch a film, or parts of a film. You will be responsible for posing questions and promoting conversation in small groups. You will be evaluated on your leadership and participation during discussions. Articles (PDF) for reading will be posted on the course website the Friday before each discussion section. The point of the discussion section is to read peer-reviewed literature and become familiar with current findings about Arctic marine ecology.

Short Assignments: Each week, you will be required to write a **1-paragraph review for each assigned article** identifying novel aspects and/or providing a critical critique of the material. The paragraphs will be due by **11:59pm each Wednesday** (20% of final grade). In the paragraph, describe the major strengths and weaknesses of the readings, as well as your overall opinion or evaluation of the reading. You can also comment on parts of the reading you did not understand or would like to further discuss. Strengths and weaknesses

may include: issues of study design, analyses, interpretation, bias, accuracy, context, constraints, limitations, and other such factors. Do not comment on language or difficulty of reading. You should also prepare **one critical discussion question for each weekly scientific article**. We will use these during the discussion section. These questions may be conceptual, philosophical, or clarifying in nature. Try to prepare questions that will be good for discussion. The short assignments will be graded on a 5-point scale based on quality and completeness; the rubric can be found on Canvas.

The assignment should be typed into a Word or PDF document, and needs to be single spaced in 12-point font and 1 inch margins. The short assignments should be uploaded to Canvas by **11:59pm each Wednesday**. These assignments will be graded on a scale of 0-5. A grade of 5 will be given when the assignment includes a paragraph for each assigned article. Each paragraph effectively identifies novel aspects of the study and/or provides a critique of the material. The major strengths and weaknesses of the readings are described, and an overall opinion or evaluation of the reading is provided. Relevant discussion questions are written for each assigned article. A grade of 4 will be given when the assignment includes a paragraph for each assigned article, but a paragraph is missing one element (missing discussion of novel aspects/critique, strengths/weaknesses, opinion, or discussion question). A grade of 3 will be given when the assignment includes a paragraph for each assigned article, but a paragraph is missing more than 1 element (i.e. missing discussion of novel aspects/critique, strengths/weaknesses, opinion, or discussion question). This score is also assigned if multiple paragraphs are all missing one element (i.e. more than one missing discussion question). A grade of 2 will be given when the assignment is incomplete (paragraphs for one or more articles are missing) but the paragraphs that are present include all necessary elements. A grade of 1 will be given when the assignment is incomplete (paragraphs for one or more articles are missing) and the paragraphs that are present are missing many of the required elements. A grade of 0 will be given when no assignment is turned in. This grading rubric is also available on Canvas. These assignments will prepare you for participating in the Discussion section. Papers for discussion section the following week will be posted by Friday afternoon.

Quizzes and Exams: There will be one written midterm (30% of final grade) on **February 12** and two quizzes (20% of final grade). The exam will cover the assigned reading and material covered in lecture. The midterm exam will consist of multiple choice, short answer (problems, definitions, compare-and-contrast, etc.), and short essays. Quizzes will be similar but shorter (approximately 20-25 minutes long). The purpose of the midterm exam will be to test your knowledge of ecological concepts, terms, and processes. Potential types of questions that may appear on the exam will be raised during Discussion sections so students gain practice in addressing scope and content.

Final Paper: A significant portion of your grade is based on a final written research paper about a subject in Arctic ecology that has management, conservation or climate-related relevance (30% of final grade). You will prepare a **10 page written research paper (1.5 spacing, Times font)** on your chosen subject of interest to you about Arctic marine ecology. The topic does not have to be something covered in the class and it does not have to specifically be about vertebrates (e.g., if you want to research invertebrates or some

aspect of climate or oceanography you may). In order to successfully complete the final assignment students will need to understand the material presented in lecture and discussion group and be able to synthesize current peer reviewed literature.

Topics will be proposed and reviewed in mid-February during Discussion section and final topics are due on **20 February**. Detailed instructions for topic proposal and the final paper will be provided separately but the paper is due on **Monday March 18 at 11:59 pm** (uploaded onto Canvas). The final paper will be graded with a grading rubric. At any point in the course, if you have a draft of your paper ready, you can ask for a conference with Dr. Laidre or the TAs to discuss your paper in the context of the rubric and improve your grade. Do not wait until the last minute to write your paper.

Examples of good research topics (focused on a specific topic):

- *How has Traditional Ecological Knowledge (TEK) been integrated into scientific management for marine mammals across the Arctic? What are the obstacles? What is the potential?*
- *What are the hypotheses about how sea ice loss will impact pelagic and benthic biological communities in Arctic seas? What data are available to support various hypotheses? Detail at least three scientific studies that support your arguments.*


A WHITE BEAR.

Examples of bad research topics (too broad):

- *"What marine bird species inhabit the Arctic?"*
- *"What are primary examples of climate change in the Arctic"?*

Required Field Trip: "Behind the scenes with polar bears and walrus" at Point Defiance Zoo and Aquarium: Details and date to be announced. UW Vans will be provided for all students from the SAFS parking lot, or you may carpool in your own vehicle upon arrangement.

Extra Credit opportunity: Participate in the Polar Science Weekend, **March 1-3, 2019** at the Pacific Science Center, downtown Seattle. All volunteers will attend a Science Communication course run by the Pacific Science Center held during lecture on **February 26**. More information to be announced.

OTHER POLICIES:

Attendance Policy: Attendance will not be recorded in lecture. Students are individually responsible for all information presented in lectures, guest lectures, readings and discussion sections. No make-up exams will be scheduled and no late short assignments will be accepted unless of a serious medical or family emergency. In the case of emergency, I will work with the student individually. Formal health care documentation will be required for legitimate emergencies.

Academic Dishonesty: Trust between student and instructor is of paramount importance in academic settings. Academic dishonesty will not be tolerated in the classroom, and students found cheating will be punished to the full extent that University policy permits. For specific information, please refer to the Student Handbook: (http://www.washington.edu/students/handbook/conduct.html).

Plagiarism: Paraphrasing or quoting another's work without explicitly citing the source is plagiarism and a form of academic misconduct. Even inadvertent or unintentional misuse of appropriation of another's work (such as relying heavily on source material that is not expressly acknowledged) is considered plagiarism. If you have any questions about using and citing sources, you are expected to ask for clarification. This includes websites like Google and Wikipedia, although note that not all information retrieved (in fact most!) from such sites is not peer-reviewed, and thus not often scientifically valid. Any suspected cases of academic misconduct will be handled according to University regulations. More information can be found at: http://depts.washington.edu/grading/issue1/honesty.htm Students will receive NO credit for an assignment which contains plagiarized portions. Typical plagiarism "oversights" are:

1. Copying an assignment from a friend with whom you study, OR working so closely with this friend that both your assignments LOOK copied (same words and ideas in the same order).
2. Copying whole sentences from a web site without restating in student's words or without quotation/citation.

Mobile Phone, email and laptop policy: Mobile phone use is disruptive to you and your fellow students learning, as well as my teaching. **No use of mobile phones will be permitted in class**. All phones should be on silent (not vibrate). Laptops are allowed in class only if they are used for class material such as note taking or manuscript reading. I expect emails to myself or the teaching assistant to be composed professionally with proper sentence and English writing style, a clear subject line, and a concise question.

Dropping/Adding: University policies on drops, adds, changes of grade option, or change to audit status will be enforced in this course. These policies are described in the course catalog and are YOUR responsibility to follow.

***Incompletes*:** An incomplete is given only when the student has been in attendance and has done satisfactory work until within two weeks of the end of the quarter and has

furnished proof satisfactory to the instructor that the work cannot be completed because of illness or other circumstances beyond the student's control. *(Source: UW General Catalog Online, "Student Guide/Grading")*

Diversity: We each enter this classroom community with a unique set of experiences and different backgrounds that will inform our readings of and reactions to these texts. Because of this wide variety of perspectives, we must all agree to respect the validity of everyone's experiences in this community. At the same time, we must also listen to others' experiences and be willing to reconsider our own perspectives in light of such new information. Respect for diversity of all kinds - in terms of race, ethnicity, age, sex and gender, sexual orientation, ability/disability, educational background, political and ideological belief, and so on – is vital to creating a respectful, safe and stimulating intellectual environment.

Disability Accommodations: To request academic accommodations due to a disability, please contact Disability Resources for Students, 448 Schmitz, (206)543-8924 (V/TTY). If you have a letter from Disability Resources for Students indicating that you have a disability which requires academic accommodations, please present the letter to the instructor so we can discuss the accommodations needed for this class.

2019 LECTURE SCHEDULE (lectures subject to change):

week 1	1/8	Lecture: Introduction to course objectives, expectations, "What and where is the Arctic?"
	1/10	Lecture: Frozen Oceans
		Discussion section
week 2	1/15	Lecture: Open Oceans
	1/17	Lecture: Biodiversity and species niches in the Arctic marine ecosystem: From invertebrates to mammals
		Discussion section - Burke Museum Field trip
week 3	1/22	Lecture: Arctic seabird ecology (Dr. George Divoky, Friends of Cooper Island)
	1/24	**QUIZ (25 min)** and Lecture: Food webs and energy flow in the Arctic marine ecosystem
		Discussion section
week 4	1/29	Lecture: Polar Bears in the Arctic: An icon of climate change
	1/31	Lecture: Polar bears in the Chukchi Sea, Alaska (Dr Eric Regehr, UW)
		Discussion section
week 5	2/5	Lecture: Stress, adaptation and survival in the cold - how do species cope with extremes?
	2/7	Lecture: The narwhal
		Discussion section
week 6	2/12	**IN CLASS MIDTERM**
	2/14	Large baleen whales in subArctic and Arctic (Erica Escajeda, SAFS)
		Discussion section
week 7	2/19	Lecture: Humans in the Arctic: History, exploration, culture, subsistence hunting in the marine ecosystem, traditional knowledge
	2/20	**FINAL PAPER TOPICS DUE AT 11:59 PM**
	2/21	Lecture: Niaqornat
		Discussion section
week 8	2/26	Guest instructors from Pacific Science Center (SCIENCE COMMUNICATION WORKSHOP)
	2/28	Ice Seals (Dr. Peter Boveng, NOAA)
		Discussion section
	3/1-3/3	POLAR SCIENCE WEEKEND 2019 Pacific Science Center (Friday to Sunday): EXTRA CREDIT
week 9	3/5	Lecture: Comparison between the Arctic and Antarctic ecosystems: Similarities and differences in community structure
	3/7	**QUIZ (25 min)** and TA presentation on how to write a scientific paper
		Discussion section
week 10	3/12	Lecture: Whale population management, walrus and the NW Passage
	3/14	Lecture: Grief and Climate change - the Future (Dr. Jennifer Wren Atkinson, UW Bothell)
		Discussion section
	3/18	**FINAL PAPER DUE 11:59 PM**

Grading Scale*

LETTER	PERCENT	GPA	NOTES
A	≥95	4.0	
A	94	3.9	
A–	93	3.8	
A–	92	3.7	
A–	91	3.6	
A–	90	3.5	
B+	89	3.4	
B+	88	3.3	
B+	87	3.2	
B	86	3.1	
B	85	3.0	
B	84	2.9	
B–	83	2.8	
B–	82	2.7	
B–	81	2.6	
B–	80	2.5	
C+	79	2.4	
C+	78	2.3	
C+	77	2.2	
C	76	2.1	
C	75	2.0	
C	74	1.9	
C–	73	1.8	
C–	72	1.7	
C–	71	1.6	
C–	70	1.5	
D+	69	1.4	
D+	68	1.3	
D+	67	1.2	
D	66	1.1	
D	65	1.0	
D	64	0.9	
D–	63	0.8	
D–	62	0.7	Lowest passing grade
E	<62	0.0	Academic failure, no credit earned

*Note that there will be no curve.