

MBI 320: Aquatic Ecology (Fall 2026)

3 credits

Instructor: Dr. Sarah Mincks

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Office: 233 Irving II

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Class Meetings: M W F, 10:30 – 11:30

Prerequisites: BIOL F115, 116 or MBI 211, 212

Teaching assistant: Konner Donley

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Catalog Description

An introduction to the relationship between marine species and their environment with an emphasis on biological interactions and environmental factors that structure marine communities.

Course goal

At the end of this course, students will have a fundamental understanding of major concepts and theories in ecology, and their application in marine ecosystems.

Learning Objectives

1. Interpret theories regarding marine ecological interactions
2. Discuss theories of evolution and their application in marine communities
3. Describe the flow of energy and organic material through marine ecosystems
4. Compare and contrast the roles of abiotic and biotic factors in shaping the distribution of marine organisms and assembly of marine communities.
5. Quantify factors that contribute to marine population variation.
6. Examine the role of inter- and intra-specific interactions in assembly of marine communities
7. Assess methods of diversity estimation and their application in marine habitats.
8. Develop and apply critical thinking skills in evaluating ecological models, and current topics in marine ecology.
9. Discuss current topics and issues in marine ecology.

Course Format and Expectations

This lecture-based course will be augmented with in-class discussions of the primary scientific literature, and other student projects or assignments. Students are expected to attend class in person whenever possible, unless based outside of Fairbanks. Lectures will not be routinely recorded, but can be recorded on request in the event of absences due to illness, field work, or other unavoidable situations.

Communication: Course materials, including readings and assignments, will be available via Canvas. Any urgent information, such as last-minute changes to meeting times or locations, will be communicated via Canvas Announcements--**please make sure your Canvas notifications are enabled** so that you receive course updates and information in a timely manner. Please reach out via email or phone, or approach me after class to discuss any questions, technical challenges, or personal difficulties that may arise during this course—I will do my best to accommodate student needs wherever possible.

Many of the ecological principles we cover in this course apply mathematical models to describe the mechanisms that govern species distributions and population dynamics. While this course is not heavily

quantitative, we will discuss these approaches during class, and exams/assignments may involve quantitative problems. The primary goal is to gain a conceptual understanding of the application of these tools, rather than to memorize or derive equations.

Readings

Ecology, by Bowman & Hacker is the recommended text for this course. Lectures will also rely heavily on material from the primary scientific literature, and additional readings may at times be assigned to supplement lecture material. The ability to acquire and synthesize information from scientific research papers is an essential skill for careers in the life sciences, and developing that skill is an important goal in this course.

Discussion Readings

In-class discussions of scientific papers will be held most weeks during the semester, and will typically include discussion of two papers. Students will be asked to select a paper and lead at least one discussion at some point during the semester; some discussions will be instructor-led. Readings will be distributed one week in advance.

Participation in discussions will be graded according to the rubric below (10 pts). An additional 5 points will be awarded to the student lead for each discussion. As an in-class group activity, discussion cannot be made up due to absence. However, you will be allowed to drop your lowest discussion grade. If you must miss more than one discussion, please contact the instructor for an alternative assignment.

Score	Criteria
10 pts	Actively engaged, asking questions and speaking multiple times during discussions, demonstrating thorough reading of the material
8 pts	Engaged, speaking during discussion, demonstrating some familiarity with the reading materials
6 pts	Somewhat engaged, speaks only when called upon during discussion, demonstrates only cursory reading of the material
4 pts	Not engaged, mostly silent, difficulty answering questions when called upon, has not read all material
2 pts	Present, but silent during discussion; unprepared
0	Absent

In preparation for discussions, you might ask yourself the following questions:

- What is the relevance to the recent lecture topics? Does this paper add any new information not covered in lectures?
- What is the purpose of the paper? Is the purpose clearly stated? Justified?
- Are the methods appropriate to the question, goal, or hypothesis stated? What would you do differently?
- What are the key results? Do they address the stated hypothesis and/or objectives? Do the figures present the results clearly?

- Do the conclusions follow from the results? Are there broader implications for the field of marine science/biology/fisheries? Are there any new questions suggested by the findings?
- What made this paper easy to follow, or not? Is there anything you would have done differently?

Exams

Two **midterms** and one **final exam** will be given during the course. The exams will be take-home, open-book short essay questions. The final exam will include material presented throughout the semester, but will be weighted more heavily toward material covered after the second midterm. Exams will focus on material covered in lectures, thus it is imperative that you attend lectures. Given that exams are take-home, late papers will NOT be accepted. However, if students become seriously ill they should notify the instructor as soon as possible and alternative arrangements should be made.

Student Project

Students will research a topic of interest during the semester, and give a short presentation to the class. More details will be provided in class.

Grading

Final semester grades will be assigned according to the following scale (fractions will be rounded up to the nearest whole number):

A+ 98-100%	A 93-97%	A- 90-92%
B+ 87-89%	B 83-86%	B- 80-82%
C+ 77-79%	C 73-76%	C- 70-72%
D+ 67-69%	D 63-66%	D- 60-62%
F <60%		

I follow the University of Alaska Fairbanks Incomplete Grade Policy: “The letter “I” (Incomplete) is a temporary grade used to indicate that the student has satisfactorily completed (C or better) the majority of work, but has not been able to complete all coursework during the regular semester for reasons beyond the student’s control (e.g., extended illness or family emergency). Negligence, busy schedules, or poor time management are not acceptable reasons for an “I” grade.”

UAF Policies

Student protections statement: The university respects and upholds the principles of due process and a fair and equitable process as specified in the Board of Regents’ Policy 09.02 Student Rights and Responsibilities. For more information regarding the rights and responsibilities of students, refer to the [Office of Rights, Compliance and Accountability website](#). You are encouraged to read the Board of Regents’ policy carefully to fully understand your responsibilities to our community.

We strive to create a safe and respectful environment for all members of our community. If you have questions about expectations of you as a student or believe your rights are being violated, we encourage you to reach out to the Office of Rights, Compliance and Accountability for help. UAF reserves the right to suspend, expel or take other necessary and appropriate action in cases where a student is unable or unwilling to uphold community standards and campus safety.

For more information on your rights as a student and the resources available to you to resolve problems, please go to the following site: <https://catalog.uaf.edu/academics-regulations/students-rights-responsibilities/>.

Disability services statement: UAF is committed to creating a learning environment that meets the needs of its diverse student body. If you have a disability, or think you might have a disability, please contact Disability Services (DS) to request a reasonable accommodation. Accommodations are not retroactive, so students should request accommodations as early as possible, since they might take time to implement. Students should notify DS at any time during the semester if adjustments to their communicated accommodation plan are needed, and must request their accommodations each semester. More information is available online at <https://www.uaf.edu/disability>, and students can reach DS at uaf-disability-services@alaska.edu or 907-474-5655.

ASUAF Advocacy & Engagement: The Associated Students of the University of Alaska Fairbanks (ASUAF), UAF's student government, works to represent student voices and improve the student experience. Students are encouraged to get involved in shaping policies, sharing feedback, and helping address issues that impact campus life. ASUAF also offers support in navigating university processes and connecting with the right resources when challenges arise. To get involved or seek support, visit the ASUAF office or email asuaf.office@alaska.edu.

Student Academic Support:

- Communication Center (907-474-7007, uaf-commcenter@alaska.edu, Student Success Center, 6th Floor Room 677 Rasmuson Library)
- Writing Center (907-474-5314, uaf-writing-center@alaska.edu, Student Success Center, 6th Floor Room 677 Rasmuson Library)
- UAF Math Services (907-474-7332, uaf-traccloud@alaska.edu)
 - Drop-in tutoring, Student Success Center, 6th Floor Room 672 Rasmuson Library)
 - 1:1 tutoring ([by appointment only](#)), 6th Floor Room 677 Rasmuson Library
 - Online tutoring ([by appointment only](#)) available
 - <https://www.uaf.edu/dms/mathlab/>, available at the Student Success Center
- Developmental Math Lab (Gruening 406, <https://www.uaf.edu/deved/math/>)
- The Debbie Moses Learning Center at CTC (907-455-2860, 604 Barnette St, Room 102, <https://www.ctc.uaf.edu/student-services/student-success-center/>)
- For more information and resources, please see the Academic Advising Resource List <https://www.uaf.edu/advising/students/index.php>

Student Resources:

- Disability Services (907-474-5655, uaf-disability-services@alaska.edu, 110 Eielson Building)
- Student Health & Counseling [**free counseling sessions available**] (907-474-7043, <https://www.uaf.edu/chc/appointments.php>, Whitaker Building, Room 206, Health, Safety & Security Bldg - same building as Fire and Police)
- Office of Rights, Compliance and Accountability (907-474-7300, uaf-orca@alaska.edu, 3rd Floor, Constitution Hall)
- Associated Students of the University of Alaska Fairbanks (ASUAF) or ASUAF Student Government (907-474-7355, asuaf.office@alaska.edu, Wood Center 119)

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For more information, contact:

UAF Office of Rights, Compliance and Accountability
1692 Tok Lane
3rd floor, Constitution Hall, Fairbanks, AK 99775
907-474-7300
uaf-orca@alaska.edu

Course Outline

Timing is approximate and subject to change. Students should be prepared for in-class literature discussion ~ every week.

Week		Lecture topic	Quantitative topics	Reading
1	Introduction	Course intro and overview; scientific method	<i>Basic stats</i>	Chapter 1
	Organisms and their Environment	Physical Environment		
2		Physical Environment (continued)		Chapters 2 & 3
		Aquatic Biomes		
3		Ecophysiology	<i>Q10</i>	Chapters 4 & 5
4	Evolutionary Ecology	Ecology and Evolution		Chapter 6
		Evolution of life history strategies		Chapter 7
5	Behavioral Ecology	Behavioral ecology; Evolution of behaviors		Chapter 8
		Midterm 1		

6	Populations: Distribution, Growth and Dynamics	Population Abundance and Distribution: Spatial Variation		Chapter 9
		Population dynamics: Change through time		Chapter 10
7		Population Growth and Regulation	<i>Life Tables</i>	Chapter 11
		Predation	<i>Lotka- Volterra predator-prey</i>	Chapter 12
8	Biotic interactions	Competition	<i>Lotka- Volterra competition</i>	Chapter 14
		Mutualism/ Commensalism		Chapter 15
9	Communities	Community Structure	<i>Shannon diversity</i>	Chapter 16
		Community Structure II: Succession		Chapter 17
10		Dispersal and Recruitment		
11		Midterm 2		
12		Biogeography		Chapter 18
		Diversity		Chapter 19
13	Ecosystems	Diversity (continued)		Chapter 19
		Productivity		Chapter 20
14		Food webs / Trophic Ecology		Chapter 21
		Thanksgiving		
15		Nutrient Cycles		Chapter 22