



MARINE BIOLOGY - ZOOLOGY 304

Course Information

Course number: Zoology 304

Course title: Marine Biology

Credits: 2 credit hours

Prerequisites: ZOOLOGY/BIOLOGY 101 and 102 or ZOOLOGY/BIOLOGY/BOTANY 152 or BIOCORE 381

Instructor Information:

Nazan Gillie

Department of Integrative Biology

University of Madison, Wisconsin

Phone: 608-262-2741

Email: atilla@wisc.edu

Office location: 152 Birge Hall, 430 Lincoln Drive

Textbook information:

There are no textbooks required for this course.

Catalog Description:

We will explore the biological and ecological systems of the oceans and marginal seas. Our work will focus on understanding how marine organisms interact with their physical environment and how the biological components of the oceans are interconnected through trophic interactions and habitat selection.

Catalog Attributes:

Intermediate level

Breadth in Biological Sciences

Course Overview:

We will make a gradual progress from understanding physical and chemical properties of the water to habitats and ecosystems. Specific examples, along with assignments, readings and discussions will help us understand how land and sea are connected. From shallow habitats (rocky shores, mudflats) and their dwellers to the deep sea (hydrothermal vents), we will explore how animals adapt to their environment and how this leads to diversity. We will tie physical properties of water (circulation, stratification) to the life history of the organisms (dispersal, survival and settlement). As home to more phyla than any other ecosystem, we will talk about the animal, particularly invertebrate, diversity. Finally, we will explore the human impact on the seas such as point and non-point pollution, global warming and overfishing.

Course Learning Outcomes

At the completion of this course, you will be able to:

- Describe the oceanic environment, its chemical and physical factors and life in a fluid medium.
- Explain the processes in the open sea: Nutrients, productivity, food webs.
- Identify and describe marine organisms in their habitats: How they function and adapt.
- Explain the drivers behind the diversity of marine life: Habitat stability and diversity, evolutionary and ecological processes.
- Explain and discuss the human impact on the sea: Agricultural land to the seas, point and non- point sources of nutrients, increased primary productivity, over fishing.

Methods of Instruction:

This is an online course. You will have access to the course material including written content, short videos, discussion boards, reading and writing assignments through the Canvas learning management system. You are expected to spend approximately 90 hours of student engagement with the course learning activities during the 8-week session as described in the syllabus.

Instructor Involvement:

As your instructor, I will be available on a daily basis to take questions from you regarding course material and assignments. I will facilitate and participate the discussions as well as other learning activities, guide you through your assignments and readings. I provide you with clear expectations and instructions on what module and assignment requires. Each module of the course will have a time estimate that it takes to complete to help you plan. The deadlines for homework, discussion posts, and other assignments will be clearly indicated.

Methods of Evaluation:

Activity	Number in Course	Total Course Value
Introductions	1	5
Diagnostic quizzes	7	14 (bonus)
Short writing assignments	7	35
Peer reviews/feedback	7	35
Discussion board participation	8	40
Post a question/answer a question	7	35
Synchronous online discussions	2	10
Research paper/presentation	1	40
TOTAL		214/200 possible

Summary of Assignments

Diagnostic quizzes:

There will be a diagnostic quiz in each module of the course. These quizzes will make you and your instructor know how much you already know about topics. These are non-graded quizzes which will not affect your grade. You can take these quizzes at the end of the modules to see how much you have learned about the topics. You will earn one point for taking the quizzes before and after, it is not a grade, it is a participation point.

Short Writing Assignments:

After reviewing the static material, videos, reading assignments you will write a short paper (no more than half a page, 200-400 words) to answer a broad question on the topics covered. The purpose of this exercise is to help you to think through the material. You will receive specific instructional and expectations for these assignment.

Peer Feedback:

Each student will be assigned to review another student's writing assignment. There will be clear guidelines of what qualities to look for before giving feedback in student assignments. In broad terms, the peer reviewers are required to ask meaningful questions and give constructive feedback. The students will not be grading each other, the instructor will grade the student papers and the peer reviewers' comments and give feedback. This exercise will allow students to practice critical thinking skills, generate ideas and questions to be discussed on discussion boards.

Discussion Board:

This is where students reflect on what they have learned from the material and from each other through the feedback they received. This is an asynchronous discussion where students will share their views on the writing assignments, their thoughts on the topics during a period of time. Questions will be posed to the students for discussion. The idea is to bring different thoughts, interpretations together to create a learning community.

Students will be able to comfortably discuss the question posed then move to more complex issues naturally. The discussion board will be monitored by the instructor to insure that it is a respectful environment.

Grading of discussions

Students earn 5 points for each of the 8 discussions. They will earn 2.5 points for posting a comment and another 2.5 points for responding to a comments. Points will be given to comments that are (a) at least 100 words (0.5pts), (b) showing clear evidence from the course materials, including readings that supports the idea expressed in the comment, and (c) written in respectful manner that promotes a positive dialog. Comments that simply state “I agree with you” will not earn any points. Students can post and respond comments more than once and some could be short and conversational. Only the comments that has the substance presented along the above guidelines will be evaluated for grades.

Synchronous Online Discussions:

At the end of each module, we will use Blackboard Ultra to have live discussion sessions. These discussions will be an hour long and facilitated by the instructor. In these synchronous discussions students will earn points based on the clarity of their answers. Similar to weekly discussions, each student is expected to comment on the topic being discussed. The comments must show knowledge of the topic based on provided material. Answers should be clear and concise. Students will earn 1 point by participating, 2.5 points by providing meaningful input in the discussion and 1.5 points by asking a question. Small groups will allow participation of each student in a short period of time.

Investigative Paper and Presentation:

The investigative paper will be an ongoing project through the course period. Students will focus on a certain process that will affect the biology of a given geographical location. For example, students will focus on hypoxia and will explore varying causes of this phenomenon given the variables that influence the process in a given geographical location (whether it's the Baltic Sea or the Gulf of Mexico). Students will work on this using Google Docs. The discussion forums and community boards are for students to share resources and help each other out. Once the paper is done, students will also prepare a 5 minute presentation to share their work with their classmates during the last week of the class.

Grading

Grades reflect your performance on assignments and adherence to deadlines. Assignments turned in late will be graded according to the instructions for a particular assignment. Graded assignments will be available within 48 hours of the due date via the Gradebook. Your grade distribution will be as follows:

Grade	Percentage	Points Range
A	93-100%	186-200
AB	87-92.9%	174-185.9
B	83-86.9%	166-173.9
BC	77-82.9%	154-165.9
C	70-76.9%	140-153.9
D	60-69.9%	120-139.9
F	Below 60%	119 and below

General Topic Schedule

Week 0: Orientation

- **Activities**
 - Read course introduction material
 - Watch the course instructor's introduction video
 - Online introductions, community building
- **Assignments:**
 - Make a 2-minute introductory video and share with the class OR
 - Create a slide with photos to tell us about yourself OR
 - Write a short paragraph about yourself

Week 1

- **Topics/Lessons:**
Introduction to Marine Biology
 - Marine Biology as a discipline
 - Historical background
 - Observation, experimentation and hypothesis
 - Habitat definitions
- **Activities**
 - Read the course material
 - Watch posted videos
 - Complete the reading assignments
 - Participate in online discussion (post a comment, respond to a comment)
- **Assignments:**
 - Take the diagnostic quiz on next week's material.
 - Write a brief essay on this week's material

Week 2

- **Topics/Lessons:**
Understanding the Oceanic environment
 - Properties of the seawater
 - Temperature, salinity, density, light
 - Oceanic environment and marginal seas
 - Mixing and circulation
 - Waves and tides
- **Activities**
 - Read the course material
 - Watch posted videos
 - Complete the reading assignments
 - Participate in online discussion
- **Assignments:**
 - Take the diagnostic test on next week's material
 - Provide feedback to the assigned student

- Post a question/answer a question writing assignment
- Complete the writing assignment
- Take next module's diagnostic test

Week 3

- **Topics/Lessons:**

- *Ecological processes in the sea*

- Ecological hierarchy,
 - Interactions among organisms
 - Marine Biogeography
 - Biomass, primary and secondary productivity

- **Activities**

- Read the course material
 - Watch posted videos
 - Complete the reading assignments
 - Participate in online discussion

- **Assignments**

- Take the diagnostic test
 - Participate in the discussion
 - Provide feedback to the assigned student
 - Post a question/answer a question writing assignment
 - Complete the writing assignment for the topic
 - Take next module's diagnostic test

Week 4

- **Topics/Lessons:**

- *Ecological processes in the sea, continued*

- Life in a fluid medium
 - Plankton, Nekton, other vertebrates
 - Critical factors in plankton abundance: Light, nutrients.
 - Microbial Loop
 - Food webs

- **Activities**

- Read the course material
 - Watch posted videos
 - Complete the reading assignments
 - Participate in online discussion

- **Assignments**

- Take the diagnostic test
 - Participate in the discussion
 - Provide feedback to the assigned student
 - Post a question/answer a question writing assignment
 - Complete the writing assignment for the topic
 - Participate in synchronous discussion (Guest speaker, Q/A)

Week 5

- **Topics/Lessons:**

- *Marine Animals in their habitats*

- Function, physiology and environment.

- Reproduction, Dispersal and Migration
- **Activities**
 - Read the course material
 - Watch posted videos
 - Complete the reading assignments
 - Participate in online discussion
- **Assignments**
 - Take the diagnostic test
 - Provide feedback to the assigned student
 - Post a question/answer a question writing assignment
 - Complete the writing assignment for the topic
 - Take next module's diagnostic test

Week 6

- **Topics/Lessons:**
Diversity of marine animals
 - Animals of the seabed, sea grass beds, rocky reefs, Kelp forests, coral reefs
 - Life in mud and sand
 - Intertidal habitats: Rocky shores, marshes, mangroves, estuaries
- **Activities**
 - Read the course material
 - Watch posted videos
 - Complete the reading assignments
 - Participate in online discussion
- **Assignments**
 - Take the diagnostic test
 - Provide feedback to the assigned student
 - Post a question/answer a question writing assignment
 - Complete the writing assignment for the topic
 - Take next module's diagnostic test

Week 7

- **Topics/Lessons:**
Human impacts and conservation of the sea
 - Marine invasion
 - Fisheries and food from the sea
 - Eutrophication, Harmful algal blooms
 - Harmful substances, oil pollution
- **Activities**
 - Read the course material
 - Watch posted videos
 - Complete the reading assignment
 - Participate on the discussion form
 - Online discussion on preparing your presentation (participation is not required but recommended)
- **Assignments**
 - Take the diagnostic test
 - Provide feedback to the assigned student

- Post a question/answer a question writing assignment
- Complete the writing assignment for the topic

Week 8

- **Topics/Lessons:**
 - Guidance on how to work collaboratively on a paper and presentation.
 - Webinar for group presentations
- **Activities**
 - Post a question/answer a question on group presentations.
 - Writing the final paper collaboratively.
 - A brief
 - Short writing essay: How does this course influenced your view of the Marine environment
- **Assignments**
 - Video presentations
 - Final paper due
 - Complete course evaluation

List of Readings:

One or more of the readings will be assigned each week to shape discussions and writing assignments.

Week 1:

Underwood, A.J., and M.G. Chapman. 1995. Introduction to Coastal Habitats. In A.J. Underwood and M.G. Chapman, eds., *Coastal Marine Ecology of Temperate Australia*. Sydney: University of New South Wales Press, pp. 1-15

Optional reading: Carson, R. *The Sea Around Us*. 1991 editions with afterword by Jeffrey S. Levinton.

Week 2:

Church, J.A. Oceans: A change in circulation? *Science*, v. 317, pp. 908-909

Grigg, R.W., and D. Epp, 1989. Critical Depth for the survival of coral islands: Effects on the Hawaiian archipelago. *Science*, v. 243, pp. 638-641.

Stachowicz, J.J., J. Terwin, R.B. Whitlatch and R.W. Osman. 2002. Linking climate change and biological invasions: Ocean warming facilitates non-indigenous species invasions. *Proceedings of the National Academy of Sciences (USA)*, v. 99, pp. 15497-15500.

A perspective on bottom water temperature anomalies in Long Island Sound during the 1999 lobster mortality event. *Journal of Shellfish Research*. v. 24, pp. 825-830.

Week 3:

Weissberg, M.J. 1993. Sex and the single forager: Gender-specific energy maximization strategies in fiddler crabs. *Ecology*, v.74, pp.279-281.

Norman M.D., J. Finn and T. Tregenza. 2001. Dynamic mimicry in an Indo-Malayan octopus. *Proceedings from Society of London B*, v. 268 pp. 1755-1758.

Paine, R.T. 1976. Size limited predation: An observation and experimental approach with the *Mytilus-Pisaster* interaction. *Ecology*. V.57, pp. 858-873

Kohn, A.J. 1967, Environmental complexity and species diversity in the gastropod genus *Conus* on Indo-West Pacific platforms. *American Naturalist*, v. 101, pp. 251-259.

Week 4:

Van Duren, L.A., and J.J. Videler. 2003. Escape from viscosity: The kinetics and hydrodynamics of copepod foraging and escape swimming. *Journal of Experimental Biology*, v. 206, pp. 269-279.

Hinke, J.T., K. Salwicka, S.G. Trivelpiece, G.M. Watters and W.C. Trivelpiece. 2007 Divergent responses of *Pygoscelis* penguins reveal a common environmental driver. *Oecologia*, v.143, pp.845-855.

Azam, F. T. Fenchel, J.G. Gray, L.A. Meyer-Reil and T. Thingstad. 1983. The ecological role of water column microbes in the sea. *Marine Ecology Progress Series*, v.10, pp. 257-265.

Tyrell, T. 1999. The relative influences of nitrogen and phosphorus on oceanic primary production. *Nature*, v.400, 525-531.

Levinton, J.S. 1991. Variable feeding behavior in three species of *Macoma* (Bivalvia:Tellinacea) as a response to water flow and sediment transport. *Marine Biology*, v.110, pp. 375-383.

Week 5:

Riffle, J.A. and R.K. Zimmer. 2007. Sex and flow: the consequences of fluid shear for sperm - egg interactions. *Journal of Experimental Biology*, v. 210, pp. 3644-3660.

Houghton, J.D.R., T.K. Doyle, M.W. Wilson, J. Davenport, and G.C. Hayes. 2006. Jellyfish aggregations and leatherback turtle foraging patterns in a temperate coastal environment. *Ecology*, v.87, pp. 1967-1972.

Larsson, A.I. and P.R. Johnson. 2006. Barnacle larvae actively select flow environments supporting post settlement growth and survival. *Ecology*, v. 87, pp.1960-1966.

Week 6:

Harrison, P.G. and K.H. Mann. 1975. Detritus formation from eel grass (*Zostera marina* L.): The relative effects of fragmentation, leaching and decay. *Limnology and Oceanography*, v.20, pp.924-934.

Okamura, B. 1987. Particle size and flow velocity induce an inferred switch in bryozoan feeding behavior. *Biological Bulletin*, v. 173, pp. 222-229.

Moran, K.L. and K.A. Bjorndal. 2007. Simulated green turtle grazing affects nutrient composition of the seagrass *Thalassia testudinum*. *Marine Biology*. V. 150, pp. 1083-1092.

Turner, R.E., E.M. Swenson and C.S. Milan. 2002. Organic and inorganic contributions to vertical accretion in salt marsh sediments. In M.P. Weinstein and D.A. Kreeger, eds. *Concepts and Controversies in Tidal Marsh Ecology*. Berlin, Springer, pp.583-593.

Week 7:

Alroy, J. and many others. 2008. Pharenozoic trends in the global diversity of marine invertebrates. *Science*, v. 321, pp. 97-100.

Roberts, C.M. and many others. 2002. Marine Biodiversity hot spots and conservation priorities for tropical reefs. *Science*, v. 295, pp.1280-1284.

Chan F.J., J.A. Barth, J. Lubchenco, A. Kirincich, H. Weeks, W.T. Peterson, B.A. Menge. 2008. Emergence of anoxia in the California current large marine ecosystem. *Science*, v. 319, p. 920.

Falkowski, P.G. and C. Wilson. 1992. Phytoplankton productivity in the North Pacific Ocean since 1900 and implications for absorption of anthropogenic CO₂ Nature, v. 358, pp.741-743.

Course Policies & Procedures

Communicating with the Instructor

This course uses a discussion board called "Hallway Conversations" for general questions about the course. All off topic, related questions such as you asking your classmates about a question not related to the course topic should be posted to Hallway Conversations. Prior to posting a question, please check the syllabus, announcements, and existing posts. If you do not find an answer, post your question. You are encouraged to respond to the questions of your classmates.

Email questions of a personal nature to your instructor. You can expect a response within 24 hours.

Email and Internet

[WiscMail](#) is an official means of communication among students, faculty, and staff. Students are expected to read and act upon email in a timely fashion. Students bear the responsibility of missed messages and should check their WiscMail email regularly.

All instructor correspondence will be sent to your wisc.edu email account.

Campus Network or Canvas Outage

When access to Canvas is not available for an extended period of time (greater than one entire evening) you can reasonably expect that the due date for assignments will be changed to the next day (assignment still due by 11:59pm).

To monitor the status of campus networks and services, please visit the [Outages page](#).

Course Time Commitment

You are expected to spend approximately 135 hours of student engagement with the course learning activities during the 8-week session as described in the syllabus. The instructor will be available on a daily basis to facilitate the activities, guide you through your assignments and readings. Please also see Methods of Instruction section above.

Late or Missed Assignments

Notify the instructor BEFORE an assignment is due if an urgent situation arises and the assignment will not be submitted on time. Published assignment due dates (Central Standard Time-CST) are firm. Please follow the appropriate University policies to request an accommodation for religious practices or to accommodate a missed assignment due to University-sanctioned activities.

Submitting Assignments

All assignments, unless otherwise announced, MUST be submitted to the designated area of Blackboard™. Do not submit an assignment via email. All submission deadlines will be posted at the beginning of each module and you will get reminders.

Drop and Add Dates/Withdrawals

This course adheres to a compressed schedule and may be part of a sequenced program, therefore, there is a limited timeline to [drop or add the course](#). If you are considering a withdrawal, please review: [Withdrawal from Classes](#), and [Term Withdrawal FAQ](#).

Grade Appeals

Students who want to appeal their grades are required to submit a request to the instructor in writing. The request to appeal has to have clear reasoning, supported by evidence, why the grade should be changed. If the dispute is not resolved with the instructor, the student may appeal to the department chair per the [appeal process](#).

Student Conduct and Academic Integrity

UW-Madison expects and requires all its students to act with honesty and integrity, and respect the rights of others in carrying out all academic assignments. For more information on academic integrity, including the policy and appeal procedures, please view the [Academic Integrity Statement](#).

Appropriate online behavior (also known as *netiquette*) is defined by the instructor and includes keeping course discussion posts focused on the assigned topics. Students must maintain a cordial atmosphere and use tact in expressing differences of opinion. Inappropriate discussion board posts will be deleted by the instructor.

The Dean of Students office accepts [incident reports](#) from students, faculty, staff, or other persons who believe that a student or a student organization may have violated the Student Code of Conduct. See also the Division of Student Life's [Safety and Health](#) resources.

Course Evaluation

Students are expected to complete the course evaluation. The feedback provides valuable information to the instructor and the college and is used to improve student learning. Students are notified when the online evaluation form is available.

Syllabus Disclaimer

The syllabus is a statement of intent and serves as an implicit agreement between the instructor and the student. Every effort will be made to avoid changing the course schedule but the possibility exists that unforeseen events will make syllabus changes necessary.

Please remember to check your WiscMail email and the course site often.

Accessibility Statement

The University of Wisconsin-Madison supports the right of all enrolled students to a full and equal educational opportunity. The Americans with Disabilities Act (ADA), Wisconsin State Statute (36.12), and UW- Madison policy (Faculty Document 1071) require that students with disabilities be reasonably accommodated in instruction and campus life. Reasonable accommodations for students with disabilities is a shared faculty and student responsibility.

Students are expected to inform faculty [me] of their need for instructional accommodations by the end of the third week of the semester, or as soon as possible after a disability has been incurred or recognized. Faculty [I], will work either directly with the student [you] or in coordination with the [McBurney Center](#) to identify and provide reasonable instructional accommodations.

Disability information, including instructional accommodations as part of a student's educational record, is confidential and protected under FERPA.

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(fax) 608-265-2998

Technical Requirements & Support

Computer Requirements

This course requires Internet access and the following:

A web browser (use only [Google Chrome](#) or [Mozilla Firefox](#))

[Adobe Acrobat Reader](#) (free)

[Adobe Flash Player](#) (free)

Microphone (optional) and speaker

Technical Support

This course uses Canvas to deliver course content. It can be accessed through Learn@UW at <https://learnuw.wisc.edu/> or <https://canvasinfo.wisc.edu/>

To monitor the status of campus networks and services, visit the DoIT Outages page at <http://outages.doit.wisc.edu/> or via Twitter by following @UWDoit.

To contact the help desk 24 hours a day, 7 days a week, please contact the DoIT Help Desk:

Phone: 608-264-4357

Email: help@doit.wisc.edu

Web: <https://kb.wisc.edu/helpdesk/> (Chat and walk-in help also available)

Student Success

This is an online course. To be successful:

- check the course daily
- read announcements
- read and respond to course email messages as needed
- complete assignments by the due dates specified
- communicate regularly with your instructor and peers create a study and/or assignment schedule to stay on track