SIO 133. Marine Mammal Biology (4 units) – Spring Quarter 2020

A) General Information

Introduction to the biology, ecology, evolution, and conservation status of marine mammals. Description of marine mammal taxa (mysticetes, odontocetes, pinnipeds, sirenians, sea otters), their anatomy, physiology, ecology, and behavior. Impacts of whaling, fisheries interactions, and other anthropogenic threats. Prerequisites: BILD 3 and upper-division standing or consent of instructor. (S)

Instructors

Simone Baumann-Pickering – SBP (sbaumann@ucsd.ed)
Pronouns: She/her/hers
Office hours*: Tuesdays 11am-12 pm via zoom meeting
Join URL: https://ucsd.zoom.us/j/389962647; Meeting ID 389-962-647

Dovi Kacev – DK (dkacev@ucsd.edu)
Pronouns: He/him/his
Office hours*: Thursday 2-3 pm via zoom meeting
Join URL: *TBD*; Meeting ID *TBD*

Teaching Assistants

Angela Szesciorka – AS (aszescio@ucsd.edu)
Pronouns: She/her/hers
Office hours*: Mondays 10-11 am via zoom meeting
Join URL: https://ucsd.zoom.us/j/906646463; Meeting ID 906-646-463

Chloe Kotik – CK (ckotik@ucsd.edu)
Pronouns: She/her/hers
Office hours*: Fridays 11:00am - 12:00pm via zoom meeting
Join URL: https://ucsd.zoom.us/j/394177078; Meeting ID 394 177 078

*all office hours are kept weekly via zoom but a prior email to inform about intent to attend the office hour is expected.

Lectures

Lecture Online: All lectures will be provided on Canvas as a series of videos with accompanying material for each topic. These should be worked on each week to then be discussed and quizzed during the following week. https://canvas.ucsd.edu/

Lecture Discussion: Tuesdays 8-9 am via zoom meeting
Join URL: https://ucsd.zoom.us/j/499855763; Meeting ID: 499-855-763
The instructors will be available to discuss the material with a live Q&A session. Please be prepared with questions.

Sections
Teaching assistants will give sections each week via zoom meeting. While attendance used to be mandatory, due to the special circumstances this quarter we instead highly recommended to attend.

For Week 1, sections will meet as scheduled to go over introductory material. Students should come prepared having read through the syllabus.
Starting Week 2, students will be asked to submit questions about the last week of material on Canvas prior to their section meeting. Even if you cannot attend section online, please submit questions to facilitate group discussion.

A01 Mondays 11:00-11:50 am – with Angela Szesciorka
Join URL: https://ucsd.zoom.us/j/574757208; Meeting ID 574-757-208

A02 Mondays 12:00-12:50 pm – with Angela Szesciorka
Join URL: https://ucsd.zoom.us/j/450819404; Meeting ID 450-819-404

A03 Fridays 9:00-9:50 am – with Chloe Kotik
Join URL: http://ucsd.zoom.us/j/489761606; Meeting ID 489 761 606

A04 Fridays 10:00-10:50 am – with Chloe Kotik
Join URL: http://ucsd.zoom.us/j/457789461; Meeting ID 457 789 461

Recordings of Lecture and Section Discussions
Please be aware that we will be recording zoom meetings of lecture and section discussions to be available asynchronously for those students who cannot attend.

Textbooks
Berta, A., J.L. Sumich, and K.M. Kovacs 2015. Marine Mammals: Evolutionary Biology. 3rd Edition. Academic Press; link to online version of textbook (from UCSD network) https://www.sciencedirect.com/science/book/9780123970022

Encyclopedia of Marine Mammals. 3rd Edition, 2018. B. Würsig, J.G.M. Thewissen, and K. M. Kovacs (editors). Academic Press; link to online version (from UCSD network) https://www.sciencedirect.com/book/9780128043271/encyclopedia-of-marine-mammals

Grade
40% Weekly Quizzes (week 2-10); 30% Term Paper; 30% Final Exam

B) SCHEDULE OF LECTURES

Week 1 *March 30 - April 3*

a) Introduction to Course; Oceanography (SBP)

b) Marine Environment as a Selective Force for Secondary Marine Forms (SBP)

Week 2 *April 6 - 10*

a) Cetacean Taxonomy and Classification (DK)

b) Cetacean Systematics and Evolution (DK)

TERM PAPER TOPIC

Week 3 *April 13-17*

a) Marine Mammal Biogeography, Mustelids, Ursus (DK)

b) Pinniped and Sirenian Taxonomy and Classification (Dr. Douglas Krause)

Week 4 *April 20-24*

a) Pinniped Systematics and Evolution (Dr. Douglas Krause)

b) Anatomy & Locomotion (SBP)

TERM PAPER OUTLINE

Week 5 *April 27-May 1*

a) Diving & Energetics

b) Thermoregulation & Osmoregulation (SBP)

Week 6 *May 4 - 8*

a) Sensory Systems - Vision (DK)

b) Sensory Systems - Sound (SBP)

Week 7 *May 11 - 15*

a) Odontocete Acoustics (SBP)

b) Mysticete Acoustics (SBP)

TERM PAPER DRAFT FOR PEER REVIEW

Week 8 *May 18-22*

a) Behavior & Social Systems (DK)

b) Mating, Life History & Population Dynamics (DK)

TERM PAPER PEER REVIEW

Week 9 *May 25-29*

a) Whaling & Bycatch (DK)

b) Seal Harvest (DK)

TERM PAPER DUE

Week 10 *June 1 - 5*

a) Disease & Pollution (incl. Noise) (SBP)

b) Climate Change Impacts (SBP)

Week 11 *June 11*

FINAL EXAM

C) TERM PAPER

Your term paper, a review paper, should be a concise, comprehensive synthesis of the primary literature on a topic relating to marine mammals. It should thoroughly review your topic and include the most significant references. Your paper may address a scientific, management, or conservation issue, or provide a summary of what is known about a particular species or group. A list of example topics is given below but we encourage you to develop your own ideas for a topic that aligns with your interests. As one of the goals of this assignment is to help you become familiar with using primary literature, your sources must be published in peer-reviewed scientific journals or monographs.

Requirements

The text of the paper must be between 5-7 pages in length, double-spaced, and typed in 12-point Times New Roman font.

At least two tables and/ or figures are required. These should be placed at the end of the paper, before the reference list. Each table or figure needs a caption, citation, and an in-text reference.

A 'Literature Cited' reference list is mandatory. References must be formatted as in the journal MARINE MAMMAL SCIENCE (see under reference list in guide for authors of the journal for more details). This reference list is not included in the 5-7 page requirement.

At least 10 sources from the primary literature should be used and cited. Literature must be original research published in peer-reviewed scientific journals or monographs. Lectures or websites are NOT appropriate sources for this paper.

All submissions will be made through the Canvas class site.

Grading

Grades will be based on both content, structure and on the clarity of the writing. Papers will be graded on a scale of 0-100 points based on the criteria set forth in the Term Paper Grading Rubric, see below.

Plagiarism

Students agree that by taking this course all required papers will be subject to submission for textual similarity review to Turnitin.com for the detection of plagiarism. All submitted papers will be included as source documents in the Turnitin.com reference database solely for the purpose of detecting plagiarism of such papers. Use of the Turnitin.com service is subject to the terms of use agreement posted on the Turnitin.com site.

We will not allow for plagiarism of any kind and if found in the final paper it will result in -25 points on the assignment.

Late Submission Penalties

Submissions after each deadline (11:59pm PST), will incur a late submission penalty of -5 points for each day.

Important Dates:

April 10 Term Paper Topic

Submit proposed paper topic (1-2 sentences, including a tentative title).

April 24 Term Paper Outline

Submit an outline of the paper with bullet points per subsection, including a list of references (1-2 pages total).

May 15 Term Paper Draft

Provide a complete draft of the term paper for peer review.

May 22 Peer Review

Peer review two papers of your fellow students.

May 29 Final Paper

Submit final draft of term paper after revision.

Sample Paper Topics (students are encouraged to create their own)

Taxonomy and Systematics

- How has our understanding of marine mammal taxonomy changed over time? Discuss new techniques and types of data that have had a big impact on our understanding of marine mammal taxonomy/systematics.

Evolution

- What is the evolutionary history of modern-day sperm whales? Beaked whales? Ice-breeding phocid seals?
- Compare and contrast evolutionary adaptations of marine mammals to the ocean environment with those of other secondary marine forms (marine reptiles, marine birds).
- Why did the "::insert taxon::" go extinct? (e.g. Steller's Sea Cow, Caribbean Monk Seal)

Oceanography and Ecology

- Are killer whales responsible for sequential megafaunal collapse of other marine mammals in Alaskan waters? (and/or elsewhere)
- What is the krill hypothesis and what evidence exist to support or refute it?
- How do marine mammals compete with commercial fisheries?

Biogeography

- Compare distribution patterns among pinnipeds and possible explanations for why these patterns exist.
- Why are some marine mammal species globally distributed whereas others are very localized?

Sensory Systems

- Compare a certain sensory system (e.g. vision or hearing) across taxa (e.g. pinnipeds vs. cetaceans, baleen v. toothed whales; eared v. earless seals).

Anatomy

- Describe convergent evolution of Carnivora and Cetacea to life in the marine environment.

Locomotion

- Explore the physics and physiology of cetacean movement through water. How is anatomy linked to locomotion?

Diving Physiology

- Compare diving adaptations of shallow-water and deep-diving species.
- What adaptations do deep-diving animals have for surviving under extreme conditions?

Health

- What are major disease threats to pinniped populations? How are these related to their amphibious lifestyle?
- What are the possible health effects of long-term exposure to chemical pollutants (via direct exposure or consumption in prey)?
- What effects are caused by stress from anthropogenic interaction (e.g. dolphin/tuna fishery interactions, fishing gear entanglement, ship avoidance)

Acoustics Biosonar and Communication (Odontocetes or Mysticetes)

- How do Mysticetes generate and use sound?
- Compare and contrast biosonar of multiple odontocete species.
- How do members of one pinniped family use acoustic communication for aspects of their survival and reproduction?

Whaling: Past, Present, and Future

- Why aren't all whales recovering from commercial whaling?
- What is known about illegal whaling?
- What whaling (or pinniped harvesting) operations are currently ongoing and legally allowed?
- What is the history of pinniped harvesting in North America (or in the Antarctic), how did it impact pinniped populations, and are those populations fully recovered today?
- What types of non-commercial marine mammal hunting occur today, where, for what purpose?

Behavior and Social Systems

- Compare and contrast different social systems that exist in marine mammal populations.
- What is known about the behavior and social system of "::insert taxon::"? (e.g. bottlenose dolphins, killer whales, sea lions, sperm whales)
- How does human activity disrupt normal marine mammal behavior and/or social systems?
- Why do baleen whales migrate?
- Compare and contrast migrations among different species.

Impacts of Anthropogenic Sound

- What is known about the impacts of Navy sonar on marine mammals?
- How might changes in ambient noise impact cetacean populations (e.g. increased ship noise and/or seismic exploration and extraction)?

Conservation: Bycatch and Indirect Effects

- What are the threats to Vaquita and what is being done to address those?
- Why did the Yangtze River Dolphin go extinct and what lessons can we learn from this loss?
- Why are Hawaiian Monk Seals critically endangered and what is being done to recover them?

Climate Change

- In what ways could climate change impact marine mammals and do we see potential evidence of these impacts today?
- How might long-term changes in sea ice affect marine mammals in the Arctic or Antarctic? Consider both direct and indirect effects of sea ice on marine mammal species.

Legislation and Ecosystem-based Approaches to Conservation

- How are marine mammals currently managed in the US? How does that compare with other countries worldwide?
- Are there success stories of ecosystem-based approaches to conserving marine mammals anywhere in the world?

Paper Rubric: Point Breakdown

Topic:	10 points
Outline:	10 points
Rough Draft:	15 points
Peer Review:	15 points
Final Paper:	50 points
Total:	**100 points**

Criteria	**Deficient**	**Good**	**Very Good**
Structure			
Subheadings	Paper does not contain subheadings	Paper contains reasonable subheadings	Paper contains particularly engaging subheadings; clear thought has been put into choice of headings
Points:	0	1	2
Appropriate length	Paper is over or under 5-7 pages	Paper is 5-7 pages	
Points	0	2	
Flow of the paper	Ordering of subsections and/or material does not make sense and impedes the reader's understanding	Paper shows some consideration for the order of topics and has a generally logical flow	Paper flows exceptionally well. Significant thought has been put into the ordering of topics and subtopics in a way that is pleasant to read.
Points	0	1	2
Formatting	Paper is not double spaced, 12-point font (Times New Roman)	Paper is written in double-spaced, 12-point Times New Roman	
Points	0	1	
Clarity of Writing			
Concise writing	Writing is not concise. Run-on or rambling sentences may be present.	Writing is appropriately concise and does not impede understanding	Writing is - straightforward, clear, and compelling. Sentence structures are varied and interesting.
Points	1	2	3

Grammatical Errors	Paper contains many errors in grammar that impede the flow of reading	Paper contains some minor grammatical errors that do not impede reading	Paper contains no grammatical errors
Points	1	2	3
Content			
Clarity of Purpose	Central idea and clarity of purpose are absent or incompletely expanded.	The central idea is expressed though it may be vague or too broad; Some sense of purpose is maintained throughout	Central idea is well-developed and clarity purpose is exhibited throughout the paper
Points	4	6	8
Critical and Original Thought	Little or no evidence of critical, careful thought, analysis and/or insight	Some evidence of critical, careful thought, analysis and/or insight	Abundance of evidence of critical, careful thought, analysis and/or insight
Points	4	6	8
Supporting Evidence	Little supporting evidence is provided, or supporting evidence is not relevant.	Supporting evidence is good and relevant, but general.	Supporting evidence is abundant, relevant, and specific.
Points	4	6	8
Appropriate Topic	Paper is not focused on marine mammals	Paper is well-focused on marine mammals	
Points	1	2	
Figures/ Tables			
Clarity	Figures and tables presented are unclear or not useful to the paper.	Figures/tables are clear and aid in understanding of the paper	Figures/tables are exceptionally well-presented, and add significantly to the paper
Points	0	1	2
Citation	Student does not cite, or cites incorrectly, the tables/figures used	Student correctly cites the tables/figures used in the caption	
Points	0	1	

In-text references	Figures/tables are not cited, or incorrectly cited, in the text	Figures/tables are correctly cited in the text	
Points	0	1	
Correct number	Student does not have 2 tables and/or figures from primary literature	Student has 2 tables and/or figures from primary literature	
Points	0	1	
References			
Appropriate citation of references	In-text references are not cited in the correct format and/or some references included are not cited in the text	All included references are cited in the text, in the correct format	
Points	0	2	
Number of references	Student has less than 10 references	Student has 10 or more references	
Points	0	1	
Appropriate references	Students has some references that are not from primary literature sources	All references are from primary literature sources	
Points	0	2	
Correctly formatted references	References are not in the correct format (Marine Mammal Science)	References are in the correct format	
Points	0	1	