Sharks, Skates and Rays, Oh my! Myths and Truths of Elasmobranch Biology

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Course Description:

Elasmobranchs (sharks, skates, and rays) have captivated our attention for centuries. Some people regard these animals with fear and awe, some with insatiable interest, while others seek to destroy. Why do we find these animals so intriguing? Why do shark attacks elicit so much attention when they are so rare? How have experiences with these animals and subsequent descriptions of these interactions influenced public opinion as well as state and federal regulations? How do various media portray these animals and how much of this is based on scientific fact? Which particular films, literature or events have had the most dramatic effects on public opinion and why? These are just some of the questions we will investigate this quarter as we approach broader topics of how science is communicated among scientists and translated to non-scientists. Elasmobranchs have inhabited this planet for over 400 million years and have changed very little over that time. This indicates they are very well adapted and have required very minor evolutionary alterations even in the face of drastic changes in their surroundings, which caused mass extinctions in many other lineages of organisms. There are over 800 species of elasmobranchs, more than half of which are skates and rays, though sharks often get most of the attention.

During this class we will look at elasmobranchs from a variety of perspectives and sources including scientific researchers, journalists, fictional writers and film directors. Our objective is to separate fact from fiction and explore what scientists have learned about these often elusive animals, how that knowledge is spread to the public, and how media representation of these fishes influences our opinions and decisions. Each week we will discuss a new topic in elasmobranch biology and will address relevant fiction and current news. We will cover topics on elasmobranch biology including basic anatomy, locomotion, sensory biology, feeding behavior, fisheries and conservation. Two students per week will bring an ElasMedia article (current news article which showcases an elasmobranch species) plus three thought questions based on the article. Class discussions will begin with these thought questions, and then will expand to discuss the reading assignments. Clips of relevant films or television specials will be incorporated in class sections for further discussion. Short lectures will be used to introduce new topics or explain difficult concepts from the reading.

After this class…

Your diligence and efforts in this class should provide you with many skills including improved writing, discussion, and presentation skills, the ability to understand and interpret scientific primary literature, a more insightful critical eye when reading and viewing various media, an appreciation of scientific methods, and new perspectives on biology and society. Of course you'll also have an arsenal of basic biological skills, lots of fun elasmo-facts, and a richer knowledge of the exciting world of sharks, skates, and rays! Remember, the more you put in, the more you'll come away with. Enjoy!

Course Requirements:

Participation: The success of this seminar format class relies on participation and discussion from all class members. Your success in this class requires that you attend all class sessions prepared to discuss the day's topic and participate in class activities. Constructive participation and preparation prior to class sessions will therefore make up an important component of your evaluation in addition to timely completion of all assignments. If verbal participation does not come easily to you please speak with me outside of the class so we can explore ways to enhance your comfort speaking in the classroom. Absence from class will result in a loss of participation points and late assignments will not be accepted (any emergencies will be assessed if they arise).

Reading: Reading assignments will be from the required text book (*Biology of Sharks and their Relatives*), *Sharks, Rays, and Chimaeras of California*, the field guide *Sharks, Rays, and Chimaeras of California* and selected scientific papers and articles. Reading assignments may approach 100 pages per week so be sure to plan time to complete the reading and other assignments each week. I have done my best to trim your reading assignments to information I think will be particularly interesting, important, and useful for discussion. Research has indicated that reading before class can improve your comprehension of the material and identify questions and areas of confusion. Questions can be asked in class, office hours or posted on the class discussion board. You are also welcome and encouraged to read additional parts of the reading material that have not been assigned whenever they strike your fancy. Unfortunately ten weeks just isn't enough for us to enjoy the entire book together!

Paper: The final paper in this class will be the major writing assignment and will also be the basis of your final presentation. You will choose one topic of interest relating elasmobranch biology and elasmobranchs in the media. You will use primary scientific literature as well as selected media to explore and present your chosen topic. More specific guidelines for this assignment will be provided prior to choosing your topic. The writing process for this paper will be broken up into several smaller deadlines to keep you on track to complete your paper successfully. A draft of your paper will be handed in during week 7 to enable me to provide you with feedback so you may appropriately edit your work before submitting your final paper. Over half of your final grade for the class will come directly from assignments related to constructing and presenting your final paper. Improving your writing is a primary goal of this seminar so please take time to review comments and avoid mistakes in future assignments.

Other Writing Assignments: You will complete additional 1-2 page writing assignments during this class, please see the short descriptions below in the "grading" section. These will allow you to explore different kinds of writing.

Presentation: You will give a short presentation on your paper topic so that you can share your new knowledge with the class. We will discuss both powerpoint and public speaking skills prior to presentation day in week 10.

Communication: Office hours are an excellent time for you to address any difficulties you are having with the class or to check in on your progress, or to explore ideas about anything that comes up regarding the class. I welcome each of you to come by as often as you like and ***strongly encourage*** you to come at least once during the quarter to discuss your paper topic. If you cannot make it to any of my scheduled office hours please let me know and I'll be happy to work out another time by appointment.

Grading:

-ElasMedia (10%) – choose a news article (newspaper or magazine) which showcases an elasmobranch species and post on website 2 days prior to class meeting so the entire class can read it, during class present a short summary and 3 thought questions for discussion during class. Two students will present each week, each student will do one presentation.

-Order Information Sheet (5%) – Each student will choose 1-2 biological Orders to make an information reference sheet including the number of species, biogeography, ancestry, characteristics, and example species. These will be bound together and distributed so we all have a quick reference of elasmobranch classification.

-ElasMovie (5%) – A one page written response to a film (not one watched in class) including a description of how the elasmobranch species is presented in the movie; address both personal response and scientific basis if applicable.

-Paper (broken into several smaller assignments, total – 55%)

- Paper topic, 5 primary literature sources, abstract (15% combined, each 5%) – these deadlines will help you construct your final paper in smaller manageable pieces
- Draft I (15%) – First draft of final paper including all sections (will be outlined in instructions)
- Final Paper (25%) – 15-18 page final paper

- Scientific Writing Exercise (5%) – A 1-2 page writing assignment to translate a scientific paper on elasmobranchs for the general public, for example, as a news reporter might present it.

-Presentation (10%) – final presentation based on final paper

-Participation (10%) – come to class prepared (read all assignments) and contribute to discussions and activities including debates during class.

Policies:

In accordance with the discussion-centered nature of this class, each of us must agree to treat everyone else's opinions and comments with courtesy and defend our positions intellectually to create a safe and constructive learning environment.

Assignments are due at the beginning of class any late work will lose 1/3 credit (A to A-).

Academic dishonesty such as cheating and/or plagiarism will be reported to the Dean of Students office. Please familiarize yourself with UCLA's policies at the following link: www.deanofstudents.ucla.edu/studentconduct.htm. To correctly distinguish plagiarism from citation please visit: www.library.ucla.edu/bruinsuccess.

Please contact the Office for Students with Disabilities (OSD) to make any class-related arrangements at: www.osd.ucla.edu.

Reading List:

-Text Book – *Biology of Sharks and Their Relatives*. J.C. Carrier, J.A. Musick, M.R. Heithaus. 2004. CRC Press. (Required purchase)
-*Sharks, Rays, and Chimaeras of California*, D.A. Ebert. 2003. UC Press. (Required purchase)
-Selected Primary Literature: See Reading References (PDF's will be provided on website)
-Selected fiction and films: Jaws, Finding Nemo, Blue Planet (Clips shown in class)
-Supplementary readings from *Devil's Teeth* (Susan Casey), *The Secret Lives of Sharks* (Peter Klimley) and *Shark Life* (Peter Benchley); You may purchase your own copy, some selections will be provided in class.

*Potential Field Trip to local Aquarium or LA County Natural History Museum TBA

Class Schedule:

Week	Topic	Assignment Due	Textbook Reading Due	Other Reading Due
1	Introduction to Elasmobranchs: Basic Anatomy, Classification, and Media Fame *Q: What are elasmobranchs and why are we so interested in them?!*	ElasMedia search	Ch. 1 (p. 3-4, Figures 1.2, 1.3-1.5, p. 12-14), Ch. 2 (p. 33-42, 60-62), Ch. 3 (p.79-80, 96-100)	Ebert, 2003 Introduction (p. 1-47)
2	Sink or Swim: Elasmobranch Buoyancy and Swimming Styles *Q: How are different elasmobranchs morphologically specialized for different habitats and how are they represented on screen?*	ElasMovie (1 pg); Order Info Sheet	Ch. 5 (p. 139-144, Figures 5.2-5.7, p. 146, 156-161)	Elasmoresearch.org; Bernal *et al*., 2005 (4 pgs); O'Hanlon, 2005 (1 pg)
3	Sensory Biology 1: Vision and Olfaction + Present Paper Topics *Q: Are these animals "sensory marvels?"*	Topic for final paper and presentation	Ch. 12 part 1 (p. 325-332, 350-357)	Gruber, 1977 (16 pgs); Nelson, 1963 (2 pgs); Writing Handout
4	Sensory Biology 2: Mechanoreception and Electroreception + Writing Workshop *Q: How and when do elasmobranchs use available sensory systems?*	5 sources for paper topic	Ch. 12 part II (p. 332-349, 357-358)	Maruska, 2001 (29 pgs); Kalmijn, 1971 (12 pgs); Kajiura and Holland, 2002 (13 pgs)
5	Feeding Behavior: Fact and Fiction + Feeding Debate *Q: What do we really know about elasmobranch feeding and what do we think we know?*	Paper abstract (1pg)	Ch. 6 (165-202), Ch. 17 (487-521), Ch. 8 (p. 225-231)	Research shark feeding debate
6	Sharks without Boundaries: Distributions and Migration + Tag Presentations *Q: Where do they go and why do they go there?*	Work on paper	Ch. 19 (p. 553-572)	TOPP website; Southall *et al*. 2006; tag presentation prep
7	Fisheries: Past, Present, and Future + Fishing Debate *Q: How have human interactions, specifically fishing activities effected elasmobranch populations?*	Paper Draft I (15-18pgs)	--	Stevens *et al*., 2000 (20 pgs); Zorzi & Martin, 2001 (5 pgs); Debate Research
8	Elasmobranch Conservation vs. Attacks *Q: Who's attacking whom?*	Scientific Writing (1pg)	--	International Shark Attack File (web); news articles TBA
9	California Elasmobranchs and Other topics in Elasmobranch Biology (potential guest lecturer) *Q: How are elasmobranchs represented and how does this affect our opinions and protection efforts?*	Paper revision and Presentation preparation	Ch. 10 (p. 269-286)	Writing references as needed
10	Final Presentations	Papers (15-18pgs) and Presentations	--	Presentation Tips Handout

Reading References:

Bernal D., Donley J.M., Shadwick R.E., Syme D.A. 2005. Mammal-like muscles power swimming in a cold-water shark. *Nature* 437:1349-1352

ElasmoResearch.org http://www.elasmo-research.org/education/white_shark/anatomy.htm

Gruber, S.H. (1977) The Visual system of the Sharks: Adaptations and Capability. *Amer. Zool*. 17:453-469.

International Shark Attack File: www.flmnh.ufl.edu/fish/sharks/ISAF/ISAF.htm read sections on history of the ISAF; Stats, Trends, Analysis; shark attacks in perspective; how, where, when.

Kajiura, S.M. and Holland, K.N. (2002) Electroreception in juvenile scalloped hammerhead and sandbar sharks. *Journal of Experimental Biology* 205, 3609-3621.

Kalmijn, A.J. (1971) The electric sense of sharks and rays. *Journal of Experimental Biology*. 55: 371-383.

Maruska, K.P. (2001) Morphology of the mechanosensory lateral line system in elasmobranch fishes: ecological and behavioral considerations. *Environmental Biology of Fishes* 60: 47-75.

Nelson, D.R. and Gruber, S.H. (1963) Sharks: attraction by low-frequency sounds. *Science* 142: 975-977.

O'Hanlon. 2005. Warmer-Blooded Shark Found. *Discovery News*

Souhall, E.J., Sims, D.W., Witt, M.J., Metcalfe, J.D. 2006. Seasonal space-use estimates of basking sharks in relation to protection and political-economic zones in the North-east Atlantic. *Biological Conservation* 132:33-39.

Stevens, J.D., Bonfil, R., Dulvy, N.K., and Walker, P.A. (2000). The effects of fishing on sharks, rays, and chimaeras (chondrichthyans), and the implications for marine ecosystems. *Journal of Marine Science* 57: 476-494.

TOPP website: http://www.toppcensus.org/web/Updates.aspx?WG=10&Tab=15

Zorzi G.D. and Martin L.K. 2001. Skates and Rays. *California Department of Fish and Game*. 257-261.

Writing References: Selections of these will be provided in class, you may also wish to purchase your own.

Bird by Bird, Anne Lamott

Style: Towards Clarity and Grace, Joseph M. Williams

Thinking on Paper, Howard,V.A. & Barton J.H.