Biology 356: Advanced Topics in Biology of Marine Life

Instructor:
Dr. Kristen Whalen, Biology (kwhalen1@haverford.edu)
Office Hours: By Appointment (Sharpless S314)
Meeting Times: T/Th from 2:30pm – 4:00pm located in Sharpless 113

Course Description:
Water covers 71% of the Earth’s surface and constitutes the single largest repository of organisms on the planet, with virtually all phyla represented. The oceans and its inhabitants are valuable resources for humans. Arguably, humans have had a major impact on ocean ecosystems by directly or indirectly altering habitat and changing species composition. Understanding and quantifying human impacts is needed for the evaluation of tradeoffs (or compatibility) between the needs of humans to use ocean resources and the protection of marine ecosystems and services they provide. This course will challenge students to confront issues relevant to human impacts on the marine environment and ask students to engage in a conversation about the best strategies and practices to mitigate these effects based both on prior and new scientific knowledge. Students will be tasked with describing the scope of the problem and asked to formulate solutions by providing scientific evidence in the primary literature for ways to solve these 21st century issues.

In the course of our classroom discussion students will explore metazoan evolution and those adaptations organisms have acquired in order to live in various ocean regimes, understand the chemical and physical properties of seawater, and describe the spatiotemporal patterns of organisms residing in various ecosystems and how distributions might change in light of human activity. While the course will focus on primary literature that discusses human impacts on the marine environment, other disciplinary areas such as ecology, chemistry, geology, symbiosis, and toxicology may be introduced as appropriate.

Learning Objectives: what you should “know” and “be able to do” as a result of taking this course

1. Feel confident in your ability to read and understand primary scientific papers and find relevant scientific literature
2. Students should be able to use the scientific method of inquiry, through the acquisition of scientific knowledge to competently critique biological literature
3. Students must demonstrate their ability to understand basic biological experimental design and quantitative methods to interpret data and to solve problems
4. Demonstrate your ability to communicate science to scientists
5. Demonstrate your ability to communicate science to a lay audience
6. Demonstrate your ability to synthesize scientific literature and interpret data to generate a rationale approach to solving problems
7. Students must demonstrate the ability to apply biological knowledge to current topics in the field; allowing students to gain a more global understanding of societal issues facing the Earth’s oceans. The student will develop a greater awareness of technological practices that might act to the detriment of ocean systems, and will put into practice the skills necessary to effectively communicate science to the general public.
Course Assignments and Structure:

Student Scientific Presentations (25%)

Class Discussion/Contribution (10%)

Discussion Summaries (40% - 8 summaries each worth 5%)

Layperson Summation-TED Talk (25%)

I. Student Scientific Presentations:
Each class period, pairs of students will present a topic related to human impacts on the marine environment. There will be 2-3 papers/readings assigned each class period to provide background information on the topic and will serve as the basis for our group discussion of the topic. Students that are presenting will serve as scientific ‘experts’ on the topic and will field questions about the assigned papers and ideas they propose during the discussion periods. Student presenters will prepare a three-part 40 minute scientific presentation which will include the following components:

1. Introduction to the topic providing background information relevant to the topic
   a. Include visual aids to help explain your main points
   b. Draw information from primary literature from both assigned articles and others you have found yourself to help you explain your points.

2. Summarize the problem or challenge
   a. Define a “solvable” problem under your topic. Define the scope of the problem AND what specific part or piece will you work toward solving. Focus on a specific organism, region of the ocean, or ecosystem. Try and find articles where authors have attempted to suggest solutions and present data supporting achievable objectives.

3. Propose a solution based on evidence in the scientific literature.
   a. This is your chance to apply what you have learned. Students should conduct a comprehensive literature review of topic and propose a solution/mitigation strategy based on evidence gathered from these sources. Students will be critiqued by the audience as to the feasibility of their strategy, scientific rigor, and if their solution was clearly and convincingly argued.

II. Class Discussion/Contribution:
Attendance is mandatory. Your contribution to the class is important, and it is expected readings will be completed before class to facilitate discussion. Following the student presentation of the topic/problem/solution, the entire class will engage in a discussion of the assigned papers and the proposed solution articulated by the group presenters. Class discussion will be structured as follows:

1. Student presenters will guide the audience through the papers with assistance from the instructor. They will not have visual guides, rather this will be a round table discussion, but the papers will be projected on a screen for the presenters to refer to them.

2. A panel discussion of the proposed strategy for solving or mitigating the problem will allow the audience to uncover the strengths and weaknesses of the approach, and question the presenters as to their approach and consequences.

III. Discussion Summaries – NYT style:
Each class period students that are not the designated presenters will write 1-page, single spaced summaries of the discussion/assigned scientific papers in the style of a New York Times article. The purpose of this exercise is to (i) assess your understandings of the papers and topic and (ii) your ability to communicate science to a layperson audience. During the discussion period, students are expected to pose questions almost in a “journalistic style” to the
presenters or “experts” on concepts that are unclear from the presentation or assigned reading to assist with the writing of the 1-page summary.

Guideline for NYT-style summaries (1 page, 1-inch margins, Times New Roman font, 12 point font)

1. Begin with a brief, on-topic, engaging introduction
2. Focus on the main findings and limit extraneous information
3. Limit the amount of jargon (technical scientific language) and explain each term introduced
4. Highlight the significance and importance of findings
5. Write in an organized and logical manner, including the use of appropriate transitions

These NYT 1-page summaries are to be submitted on the Moodle site in the designated folder before the following class period, no later than 2:30pm that day. **Please deposit a PDF copy of your document on Moodle.** Make sure to label your file with your last name and the date of the class discussion. For example: Whalen_Discussion_091217.pdf.

**IV. Layperson Presentation-Final Project-TED Talk:** Museums, science centers, and aquariums are faced with growing challenges of displaying contemporary science (i.e. of keeping up with the speed of scientific research). At first thought, the pace of current research seems incompatible with the nature of the museum display. Yet new programs are emerging to help the Public Understanding of Research (PUR). According to Lewenstein and Bonney (2004) PUR covers two different, though not opposite facets: on the one hand, initiatives that focus on cutting-edge research and their social, ethical and political implications; on the other hand, activities that help the lay audience understand research processes, underlying the methods that form the common ground of all scientific endeavors.

To this end, your student group will develop a visual display that communicates your topic effectively by clearly articulating the complex network of actors involved in science and society debates, their arguments, positions, agreements and disagreements. Your aim is to analyze how scientific and technical factors, as well as regulations and public debate on your topic, interact and shape a research field that is relevant to marine policy-making. The goal is to turn your earlier scientific presentation and the resulting paper discussion from a more in-depth scientific discussion into communication instruments to the lay public. This visual display will be a departure from traditional lecture format, rather students should make simple arguments through compelling visuals projected on to a large screen and give a lively talk of no more than 5 minutes. Think TED talk-style where scientists engages the public in a conversation of well formulated ideas. These talks are so effective as they allow the audience to focus on one subject at a time in short chunks. This presentation should discuss how scientists gained and manipulated data and assumptions in data and how we should move forward as a society.

The presentation will be timed and should be **5 mins in length.** The student presenters can choose a format that best suits their strengths:

1. Prezi presentation with live narration
2. Powerpoint presentation
3. Poster board* with live narration
4. Video with accompanying audio narration similar to what a patron of a museum would see if they walked up to a display.
5. Other – Kristen is open to hearing about other types of visual displays and would be happy to hear your groups thoughts.
Check with the KINSC office as to the maximum size of a printed poster. Please arrange for your poster to be printed at least 48 hours before the day of the presentation.

Guidelines for the Layperson Presentation:

1. Stick to the time guidelines (5 minutes)
2. A strong introduction is crucial
   a. You can start by challenging a belief of your audience or discuss a basic idea with a compelling new argument. If it is a heavy topic, find an understated and frank way to get off the ground; don’t force people to feel emotional.
   b. Don’t open with a string of stats
   c. Remember, an idea is not just a story or list of facts. A good idea takes evidence or observations and draws a larger conclusion.
3. The audience relies on you giving them accurate information, so fact-check and cite sources. Use research from widely accepted and peer-reviewed sources.
4. Make an outline and script of your ideas
   a. Start by making your audience care, using a relatable example or an intriguing idea
   b. Explain your idea clearly and with conviction
   c. Describe your evidence and how and why your idea could be implemented
   d. End by addressing how your idea could affect your audience if they were to accept it.
5. Make a list of all the evidence you want to use. Order the items in your list based on what people need to know before they can understand the next point. Don’t use too much jargon, or explain new terminology
6. Respectfully address any controversies in your claims, including legitimate counter arguments, reasons you might be wrong, or doubts your audience might have about your idea
7. Don’t let citations interrupt the flow of your explanation. Place them in the fine print of your slides
8. Your talk structure should be invisible to the audience. Don’t talk about how you’re going to talk about your topic – just talk about it.
9. Use as little text as possible – if your audience is reading, they are not listening
10. Rehearse, time yourself

Student Expectations:

Students will be provided with a challenging yet supportive environment in which learners have control of their learning; work collaboratively with others; know that their work will be considered fairly and honestly; and receive feedback. The choice is yours and yours alone to be an engaged learner and scholar of this material.

Please silence your cell phones* during class. This is a distraction to your fellow learners.

*If your cell phone does go off, prepare to regale us with 15 seconds of dance moves.

Grading and course requirements: please note that all major assignments must be completed to get credit for this course.
**Late Work Policy:** this course is designed so that no assignments should need extensions. No late work will be accepted.

**Professional communication/email policy:** I receive a lot of emails during the day. So I may not be able to respond to you until 24-48 hours after your email. Please plan accordingly.

You should contact me for specific situations such as the following:

- Emergencies – if an emergency arises I will work with the student and their Dean to find a mutually agreed upon solution
- Questions on the course material (which I may answer and then send to the entire class)
- Problems with the course Moodle site

**Accommodation Statement:** Haverford College is committed to supporting the learning process for all students. Please contact me as soon as possible if you are having difficulties in the course. There are also many resources on campus available to you as a student, including the Office of Academic Resources (https://www.haverford.edu/oar/) and the Office of Access and Disabilities Services (https://www.haverford.edu/ads/). If you think you may need accommodations because of a disability, please contact Sherrie Borowsky, Coordinator of Accommodations, Office of Access and Disability Services at hc-ads@haverford.edu. If you have already been approved to receive academic accommodations and would like to request accommodations in this course because of a disability, please meet with me privately at the beginning of the semester (within the first two weeks if possible) with your verification letter.