Integrative Biology 230 (IB 230)

Title: *Marine Ecosystems and Global Change*

Units: 1 Unit weekly seminar course.

University of California Berkeley

Offered Spring Semester in even calendar years (i.e., Spring 2022, 2024, 2026, etc…)

Meeting time: TBD

Location: TBD

Instructor: Dr. Jonathon Stillman, Adjunct Professor, Department of Integrative Biology
Contact:

- ***Email***: jstillman@berkeley.edu
- ***Mobile Phone***: (415) 608-7923
- ***Office Hours***: By appointment, location by arrangement
- ***Website***: https://ib.berkeley.edu/labs/stillman/
- ***Course Website***: on bCourses

Pre-requisites: Graduate student status or permission of instructor for undergraduate students.

Overview: The purpose of this course is to discuss recent advances in the effects of global change (inclusive of climate change, pollution, overfishing, introduced species, etc…) on any aspect of coastal marine or estuarine ecosystems. This class is aimed at graduate students or advanced undergraduate students ready to read the primary literature and engage in active discussions of the findings and implications. Students interested in learning about cutting edge research on the effects of climate change and other anthropogenic stressors on coastal marine and estuarine ecosystems will find this class to be worthwhile.

Student Learning Objectives:
- Expand knowledge of global change in coastal marine and estuarine ecosystems
- Develop skills in searching, accessing, and reading recently published scientific papers
- Practice discussion and presentation skills
- Networking with like minded peers
- Science Communication for public consumption

Methods of Instruction:
Seminar. Each week there will be an assigned paper. Students are expected to read the paper before class and come prepared to discuss the content of the paper. One or more students will be tasked with leading the discussion of chosen or assigned papers each week, including a brief overview presentation of the research being discussed. In the first week of the class students will be introduced to how to search the primary literature, how to read a scientific publication, and the expectations for the course (e.g., participation). In the middle of the term, students will

be introduced to best practices in science communication, ideally involving some participation by experts in science communication.

Primary readings for the course: Recently published papers from professional scientific journals will be the readings for the course. Each week we will read one article that encompasses a topic regarding the effects of climate change on marine ecosystems. All readings are open access, meaning students will be able to freely access the readings via the provided URLs. If any readings are not open access, a .pdf file of the reading will be distributed at no cost to students or an alternative reading will be selected. Example readings from the primary literature are indicated below (these papers will be read in weeks 2-8 and 10-14 of the class), subject to change as new relevant papers are likely to be published in the months prior to the course offering. In Week 9 we will read a book chapter about best practices in Science Communication.

Readings (by course week):

2. Increase in ocean acidity variability and extremes under increasing atmospheric CO2. Burger et al., 2020. Biogeosciences 17: 4633-4662. https://bg.copernicus.org/articles/17/4633/2020/
3. Emerging risks from marine heat waves. Frölicher and Lafukötter. 2018. Nature Communications 9: 650. https://www.nature.com/articles/s41467-018-03163-6
4. Marine heatwaves exacerbate climate change impacts for fisheries in the northeast Pacific. Cheung and Frölicher. 2020. Scientific Reports 10: 6678. https://www.nature.com/articles/s41598-020-63650-z
5. Responses of ichthyoplankton assemblages to the recent marine heatwave and previous climate fluctuations in several Northeast Pacific marine ecosystems. Nielsen et al. 2020. Global Change Biology. 27(3): 506-520. https://onlinelibrary.wiley.com/doi/epdf/10.1111/gcb.15415
6. Global warming and recurrent mass bleaching of corals. Hughes et al., 2017. Nature 543: 373-377. https://www.nature.com/articles/nature21707
7. Multiple Stressors in a Changing World: The Need for an Improved Perspective on Physiological Responses to the Dynamic Marine Environment. Gunderson et al. 2016. Annual Review of Marine Science. 8:357-378. https://www.annualreviews.org/doi/full/10.1146/annurev-marine-122414-033953
8. Heat Waves, the New Normal: Summertime Temperature Extremes Will Impact Animals, Ecosystems, and Human Communities. Stillman 2019. Physiology 34(2): 86-100. https://journals.physiology.org/doi/full/10.1152/physiol.00040.2018
9. *How to Deliver A Clear Message:* Chapter 8 from the book “Escape from the Ivory Tower: A Guide to Making Science Matter” by Nancy Baron. https://www.compassscicomm.org/wp-content/uploads/2020/06/Escape-from-the-ivory-tower-chapter-eight.pdf
10. Evolution in an acidifying ocean. Sunday et al. 2014. Trends in Ecology & Evolution 29(2): 117-125. https://www.sciencedirect.com/science/article/pii/S0169534713002747
11. Climate change undermines the global functioning of marine food webs. Pontavice et al., 2020. Global Change Biology 26(3): 1306-1318. https://onlinelibrary.wiley.com/doi/full/10.1111/gcb.14944

12. Marine Parasites and Disease in the Era of Global Climate Change. Byers. 2021. Annual Review of Marine Science. 13: 397-420. https://www.annualreviews.org/doi/full/10.1146/annurev-marine-031920-100429
13. Climate−induced decrease in biomass flow in marine food webs may severely affect predators and ecosystem production. Pontavice et al. 2021. Global Change Biology (early view) https://onlinelibrary.wiley.com/doi/abs/10.1111/gcb.15576
14. Climate impacts on global hot spots of marine biodiversity. Ramirez et al, 2017. Science Advances. 3(2): e1601198. https://advances.sciencemag.org/content/3/2/e1601198.short

Supplemental books / readings: none.

Other materials: None
Exams & Quizzes: None

Assignments/problem sets/projects/reports/research papers: Each student will be asked to develop one example of good science communication about a topic that we discuss in the class that particularly intrigues them. This can be in the form of a written article (e.g., a blog, a magazine or newspaper story), a graphic (e.g., a poster, display or online image), a video (e.g., a web-log), or any other format by which the public would be engaged in the topic. The science communication element does not need to be shared with the public, though this will be encouraged within the university setting (e.g., a display at Cal Day, an editorial in the Daily Californian).

Grading Procedures:

- ***Grading Breakdown:*** Participation: 80%, Science Communication: 20%
  - *Participation* score is broken down into 3 components:
    - Attendance each week: 4% per week, 60% total
    - Submitting at least 1 discussion question prior to class each week: 10% total (based on submission)
    - In-class presentation once during semester: 10% total (based on effectiveness of presentation)
  - *Science Communication* submission (20% total) will be peer-evaluated in Week 15 based on a rubric that will be distributed to students in Week 9, that covers communication effectiveness of document (10%), presentation (6%), and style (4%).
- ***Grading Scale:***
  Undergraduate: Pass (≥60%) / No-Pass <59%)
  Graduate: Satisfactory (≥60%) / Unsatisfactory <59%)

- ***Incomplete grades*** will only be allowed for the science communication assignment, not participation.
- ***Attendance*** is expected every week
- ***Class Participation*** is expected every class meeting by all attendees
- ***Decorum***: Active engagement and participation is to be expected. Devices may be used for in-class purposes only (e.g., looking up pertinent information)
- ***Interrupted exams***: N/A
- ***Missed Exams***: N/A

- ***Missed/Late assignments***: There is only 1 assignment; if it is missed no credit will be given. Late Assignments will be deducted 1/2 letter grade per week late (e.g., A to A-).
- ***Reporting Illness and Family Emergencies***: It is the duty of the student to inform the professor should any situations arise that prevent them from participating in the class.
- ***Extra Credit***: none planned, but reserve the option to make extra credit assignments.
- ***Permissible and Impermissible Collaboration***: All collaboration is permissible in groups of up to 3 students.
- ***Standards for academic honesty and penalties for infractions***: Students are expected to think for themselves, and provide credit appropriately to any source of information that they use. Any student who has plagiarized their sources will be required to meet with the professor to make sure that they understand what plagiarism is, and how to properly give credit to sources. Repeated plagiarism may result in disciplinary actions in accordance with IB Departmental guidelines.

Tentative Calendar of topics and readings:

- Week 1: Course introduction, background, organization, assignment of papers for reading and instructions for searching the literature. Course materials will be distributed as .pdf files.
- Weeks 2-8: Discussions of papers from the literature (see above for readings)
- Week 9: Science Communication Best Practices and Assignment (see above for readings)
- Weeks 10-14: Discussions of papers from the literature (see above for readings)
- Week 15 (finals): Science Communication Showcase (students share their work)

Firm dates: Science Communication submission due prior to the final week of the class.

Dates of Special Events: N/A

Tips for Success: Students should read the paper early in the week and take some time to look up any vocabulary or concepts that are unclear. Recommend students write out any questions they have about the readings and bring those to class in order to aid in their participation. At least one question must be submitted prior to class as a contribution for discussion. Common mistakes that students make is underestimating the time it takes to read a scientific research paper - they are information-dense and can take a lot of time to understand.

Copies of past exams or model student papers: None available at present. In future will be archived on Stillman's website.

Glossaries of technical terms: Suggestion to use Google or other web-based search for any unknown terms or concepts.

Links to appropriate support material on the web: Science Communication materials will be shared via bCourses

Support Services on Campus: UC Berkeley offers a wide range of support for students in need. For an excellent summary of student support options, see **https://math.berkeley.edu/campus-resources-student-support-services**

Information on the availability of video or webcast: TBD

Emergency Contact Information: Students should share contact information with 2-3 classmates in order to foster good communication in case of an unplanned absence.

Accommodation Plan: Students with disabilities of any kind should communicate directly with the professor in order to arrange appropriate accommodations.

Absence Policy for Religious Observance: Students who must miss class for religious observance should communicate their planned absence with the professor within the first 2 weeks of the semester.

Class cultural expectations: Students in this class represent a community of learners. Mutual respect of differing ideas and communication styles must be present in order to achieve an open and supportive learning environment for everyone.

Copyright Statement: Materials distributed in this class that are under copyright protection (e.g., downloaded .pdfs from scientific publications) should not be distributed and are for educational purposes only.

Student feedback strategies during the semester: At 2-3 week intervals students will be given feedback regarding their level of participation in class. Students will be given feedback on drafts of their science communication piece. Grades will be communicated through bCourses.

End-of-course evaluation procedures: The final grade for the course will be based on overall levels of participation and the final science communication submission and will be communicated via bCourses and email.

Emergency Procedures:

- *what to do in case of an earthquake:* In the event of an earthquake students are asked to take cover under tables/desk or doorways to avoid falling objects. Further instructions will be given by appropriate building managers.

- *what to do in an emergency:*
  - *FIRE:* In the event of a fire, students should pull the nearest fire alarm on their way out of the building. Students should gather outside the building at the nearest gathering place.
  - LIFE THREATENING MEDICAL EMERGENCY: In the event of a life-threatening medical emergency, students should dial 911 from a public, private or campus telephone and administer first aid if they are knowledgeable in how to do so.
  - NON-LIFE THREATENING EMERGENCY: Students should call University Police: 642-6760 and/or Environment, Health & Safety: 642-3073
- For further information:
  Emergency Contact Information: **http://bds.berkeley.edu/vlsb/emergency***University Emergency Information:* **https://emergency.berkeley.edu**

This Syllabus is subject to change