BUMP Oceanography of Stellwagen Bank and Surrounding Waters, Fall 2016

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**Prerequisites:** One year of chemistry; ES 144 (or equivalent); or permission of instructor.

**Location:** Variable. We spend several (4-6) days on the NOAA R/V Auk, which leaves from Scituate, MA. We will leave BRB around 6-6:30 AM (including Dunkin Donuts stop) and arrive late (could be 8-9 PM) back at BU. On days that we need classroom discussion, or a classroom as a “base”, we have access to two different rooms:

- BRB 118
- BUMP Marine Lab (basement of BRB)

**Overview**
This course is for upper-level undergraduate and graduate students interested in oceanography, marine biogeochemistry, and the relationships between how physical variables such as bathymetry of the seafloor and the physics of seawater (salinity, temperature) are related to biogeochemical parameters such as nutrient (C, N, P, Si) distributions. We will connect what we learn about Oceanography in the Stellwagen Bank National Marine Sanctuary to current issues and management related to oceanography, such as ocean acidification.

The course is taught during the BU Marine Program’s “Marine Semester” and with strong logistical collaboration with NOAA’s Stellwagen Bank National Marine Sanctuary (SBNMS), located in Scituate, Massachusetts. Approximately 40% of the meeting time, including staging for and participation on day long research cruises, will be on-site at NOAA facilities in Scituate. The field component will consist of multiple day long trips to Stellwagen Bank, located off the northern tip of Cape Cod, on board the Sanctuary’s 50-foot research vessel *Auk*. Laboratory work will consist of measuring nutrient concentrations in samples gathered at sea using laboratories on the BU campus. Interpretations will focus on integrating nutrient distributions, chlorophyll-a, and water parameters (temperature, salinity) with location to assess the biogeochemistry of the Stellwagen system.

You will learn research-standard analytical techniques as well as how to plan and carry out water sampling at sea and nutrient measurements onshore. Each student will work independently and as a team at various stages in the course. You will collect and analyze samples and prepare presentations to give the final week of the course. Students will write a project proposal and abstract as if applying to present your research at a conference in the marine science profession. Data processing and visualization tools will be employed throughout the course.

The *Auk* can carry 14 BU persons (students, professor, TF) on each trip. Accordingly, we will be working on the Auk and in the lab as a single scientific community.
Flexibility in your expectations both logistically and intellectually is a must!

**Data Management and Processing.** An important aspect of the course will be learning skills for data management and processing using commercially available software widely implemented by the marine science community. We have devised exercises based on Microsoft Excel and Ocean Data View ([http://odv.awi.de/](http://odv.awi.de/)) that will help get you up to speed. You will be using this software throughout the course.

In addition to integrating data you will generate from samples that you gather, we will bring into our discussion data from other sources, such as oceanographic buoys stationed in SBNMS, meteorological readings, and cruise track information.

You will keep a digital notebook (Google Doc) shared with Ingrid and Chloe. Digital notebooks will be a place for recording daily activities at sea or in the laboratory. These will be checked randomly during each week as a portion of your laboratory grade.

**Literature and Readings.** The readings will be selected from the primary literature. Two large publications in particular are germane, as follows:

1. Battista, T., et al., Editors, 2006, *An Ecological Characterization of the Stellwagen Bank National Marine Sanctuary Region.* NOAA Technical Memorandum NCCOS 45, 355 pp. This is a mammoth document and can be downloaded from this www site: [http://ccma.nos.noaa.gov/publications/NCCOSTM45.pdf](http://ccma.nos.noaa.gov/publications/NCCOSTM45.pdf). The first two chapters of it are the most relevant to this class. If you want the full version, and can’t download it yourself, we can get you a digital copy via jump drive.

2. *Final Management Plan and Environmental Assessment, Stellwagen Bank National Marine Sanctuary,* 2010. NOAA, 419 pp. This too is a massive document, but here is the online link: [http://stellwagen.noaa.gov/management/mpr/draftplan.html](http://stellwagen.noaa.gov/management/mpr/draftplan.html)
   This document helps provide the scientific context to why Stellwagen Bank is being so extensively studied and attended to.

Other readings will be announced and posted to the course Google Drive.

**Gear and Safety.** You must have steel-toed sea boots (Walmart® has terrific ones) or steel-toed workboots as well as good foul weather gear (BUMP will provide boots and foul weather gear if you need it). You will receive safety training by NOAA staff as part of the course’s orientation. Details will be provided prior to the course beginning. NOAA will require some documents to be on file regarding your contact information.

**Lecture and Research Schedule.** Attendance at all lectures, field research days, and laboratory training sessions are mandatory, and will be scheduled with us. Your final grade will be penalized 5% for each unexcused absence from a field, lecture or lab session. If you must miss a class for personal or other understandable reasons, please talk with me and we will work out an arrangement.
**Academic Conduct.** I stress the importance of your familiarity with, and adherence to, Boston University's *College of Arts and Sciences Academic Conduct Code*, in particular those portions dealing with cheating and plagiarism. I will address transgressions with vigor and without hesitation.

**Course Structure and Grading**
This will be an intensive course with long and demanding days in the field and laboratory. Typical daily hours will be long (expect 12-14 hour days when the day includes a trip on the NOAA vessel *Auk*). Due to the time constraints on this class no late work will be accepted.

Field and laboratory work should be undertaken in a highly cooperative, team-based manner. Although group work is supported and encouraged, final work on abstracts, proposals, computer exercises, presentations and field notebook entries should be individual. After data collection and potential group analysis, except for sharing of raw data, individual performance is expected. No cell phone use is allowed while on boat or during class (while riding as passengers in van is acceptable) except to take photographs, videos, or for other uses approved specifically by the instructor or TF. Unauthorized mobile device use will result in a reduction in the field performance grade.

Field Performance 35%
Laboratory Work and Digital Notebook 25%
Final PowerPoint Presentations (abstract/proposal) 20%
Presentation Delivery 5%
Data exercises 15%

**Lecture Schedule**
I repeat that flexibility in your expectations both logistically and intellectually is a must! We are highly weather dependent for our seagoing days and on those days we cannot guarantee when we will be home by. Please see BUMP Oceanograpy_Stellwagen Oceanography 2016 Course Calendar for details.

When not on *Auk*, there are two modes of the class: (1) If seawater samples need to be analyzed, you will work in groups analyzing the backlog of samples for Si, N, and P concentrations, and (2) If we are caught up with the lab work, then we will be busy studying the data, integrating with and compiling buoy data, shiptrack data, and so on. We will also have discussions on relevant material, work on exercises and discuss your research presentations during class time.

**Final Comment:** This is your second ‘block’ course in the Marine Semester, so I’m assuming you are developing an understanding of the joys and frustrations of doing actual, real research.
We (you, Chloe, me) are all in this course together. Chloe and I play the role more of “guidance counselors” than of professors, as we will all be learning on the fly together and developing a group knowledge of the Stellwagen System.