

## ES 423/623 – Marine Biogeochemistry Spring 2019

*"Each day as the sun rises and retires the beautiful green bays like great creatures breathe in and out. By day photosynthetic production of food and oxygen by plants is plentiful, but day and night there is also a furious feasting."*

H.T. Odum and C.M. Hoskin 1958

**Instructor:** Dr. Robinson (Wally) Fulweiler  
Office: STO 141D  
Phone: 358-5466  
Email: [rwf@bu.edu](mailto:rwf@bu.edu) Office Hours: T 2-3 pm, W 11:30-12:30 & by appointment

**Lecture:** T/Th 12:30-1:45 pm in CAS Room 229; FINAL EXAM= Th, 5/9 12:30 – 2:30 pm

**Required Text:** Readings from class, available on our website.

**Course Website:** [www.fulweilerlab.com](http://www.fulweilerlab.com) (password: #BUOceans)

**Course Overview** – This course is for upper-level undergraduate and graduate students interested in marine biogeochemistry. Biogeochemistry is a hot topic today in environmental science. It impacts every part of life – in fact, the National Research Council recently recognized, “*studies of biogeochemical cycles as the nation’s highest priority in global change research.*”

**My Course Goals** – I want you to leave this semester with knowledge of the foundations of marine biogeochemistry, as well as familiarity with the cutting edge new research in this field. Importantly, I also want you to learn to “think like a biogeochemist.”

**My Expectations of You** – It goes without saying – but I’ll say it here anyway – that I expect you to be prepared for class, to attend each class, and to be engaged in the learning process. I like lively classes with discussion, questions, and lots of interaction. Thus your active participation is required.

It is your job to participate and communicate. I encourage you to ask questions during class – to call me out if I am unclear or wrong. Do not wait for the end of the semester to express your feelings about any aspect of the course – I will enthusiastically listen to constructive comments and suggestions, and will respond where possible. Of course, I can only do this if I am aware of your comments, concerns, suggestions, etc. So please feel free to contact me outside of class. This does not just apply to course material – if you are interested in a particular subject and would like more information on current topics, something you saw on the news, read in the paper; if you are interested in careers in science or becoming an earth science or marine major – I am happy to help and point you in the right direction.

No cellphones are allowed in class. You are allowed to use your laptop but if you are surfing the internet instead of taking notes you will be asked to put your laptop away, if it happens a second time you will be asked to leave.

**Exams and Course Grading** – For all students there are two exams, a journal, class assignments, and a final. I do not accept late assignments and when I ask for a printed copy an email with an attachment will not count. The final exam will be cumulative, but will emphasize the latter portion of the class and big picture synthesis. Please don’t be afraid to ask questions and speak up when you don’t understand something.

For those in 423 your grade will be calculated as follows:

Exam I:	20%
Exam II:	20%
Journal:	10%

Participation/Assignments:	20%
Final Exam:	30%

### 623 Additional Responsibilities:

As graduate students you will be expected to do more in this class. You will write a research paper on a “biogeochemistry topic.” Your paper will be an in depth review paper that you will present to the class on the last two days of class. In addition, you will have extra questions on the exams and may be asked to lead some group discussions. For those in 623 your grade will be calculated as follows:

Exam I:	15%
Exam II:	15%
Journal:	10%
Participation/Assignments:	15%
Research Project:	15%
Final Exam:	30%

Journal – Reading and writing are key tools in the world of science. And like anything, the more we read and the write the better we get. To that end, you are required to keep a journal for this course. You are responsible for writing in this journal about biogeochemical topics at least two times each week. Each entry must be 300 words and clearly written – so that I can read it. Each week I will ask you to read and synthesize one paper on the topic we are covering that week, and you will be asked to find, read, and synthesize on additional paper per week.

**Lecture Absence Policy** – *Only two unexcused absences will be allowed without penalty. For each unexcused absence thereafter, your grade will automatically drop one-half grade for each absence (A to A-, A- to B+, B+ to B, etc.).*

**Diversity & Inclusion** – Diversity enriches all research and education, and is realized only with all voices, views, and perspectives operating within a supportive and respectful community. For this reason, the Department of Earth & Environment, including myself are committed to fostering diverse, inclusive, and equitable living, learning, and working environments that are supportive and free from violence, harassment, disruption, and intimidation. As a student taking this course, you are also committing to fostering such an environment. Further, the Department of Earth & Environment recognizes that creating a safe environment and a culture of respect is the shared responsibility of all members of our community. To ensure an equitable environment that values and respects the unique experiences and perspectives of our community, the Department, including myself are dedicated to promoting diversity, inclusion, and equity among all members of our departmental community and encouraging open, honest, and compassionate communication. Again, as a student enrolled in this course you are committing to creating such an environment. You can read more about our departmental efforts for fostering a safe, inclusive, learning environment here: <http://www.bu.edu/earth/about/diversityinclusion/>.

**Academic Conduct Code** – For everyone, 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 (<https://www.bu.edu/academics/policies/academic-conduct-code/>). Cases of academic misconduct will be promptly referred to the Dean’s Office.

## Semester Schedule

*Note this schedule will change, and I will keep you up to date on changes as needed.*

Date	Topic
Jan. 22	Welcome and Hellos
24	The "Biology" of Marine Biogeochemistry
29	An Introduction to the "Geology" of Marine Biogeochemistry
31	An Introduction to the "Chemistry" of Marine Biogeochemistry
Feb. 5	Salt Marsh Productivity and Organic Matter Storage
7	Microbial Metabolism/Anaerobic Respiration
12	Mangroves/Corals
14	Estuaries
19	<i>No Class, Monday Schedule</i>
21	Human Impacts on Coastal Biogeochemistry
26	<b>Exam I</b>
28	No Class - work on assignment
March 5	Open ocean productivity - GPP and NPP
7	Redfield and Limiting Nutrients
12	<b><i>Spring Break, No Class</i></b>
14	<b><i>Spring Break, No Class</i></b>
19	<i>Guest Lecture - Dr. Cedric Fichot, Earth &amp; Environment</i>
21	Biological Pump - Ocean C cycling
26	Sediment Diagenesis
28	Are Dead Zones Really Dead?
April 2	Global Ocean Nitrogen Cycle
4	Ocean Metal Cycling
9	<i>Guest Lecture - Dr. Adrien Finz, Biology</i>
11	Phosphorus and Sulfur Cycling ( <b>Exam II (take home) distributed</b> )
16	Hydrothermal Vents and Whale Falls
18	Atlantic Cod, Blue Whales, & Sooty Shearwaters are all bags of nutrients to me! ( <b>Exam II due</b> )
23	Silicon Cycling Across the Land-Ocean Continuum
25	Ocean Acidification - Fact/Fiction, Myth/Reality
30	Graduate Student Presentations
May 2	Graduate Student Presentations
9	Final Exam 12:30-2:30