Biogeochemistry of Global Change
BIOL-UA 66 or ENVST-UA 370
Spring 2021
Professor Mary Killilea
Monday and Wednesday
2:00 to 3:15 pm

Professor Killilea’s Contact Information:
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Phone: (212) 998-8268
Email: mek5@nyu.edu
Office Hours: By appointment, use this link

Course description: Biogeochemistry is the study of biological controls on the chemistry of the environment and geochemical regulation of ecological structure and function. This course will introduce the fundamental principles of biogeochemistry. Additionally, we will utilize the scientific literature from peer-reviewed journals to explore specific case studies on the global change of biogeochemistry (e.g., acid precipitation, nitrogen deposition, eutrophication of the oceans, etc.) from the field of biogeochemistry.

Course goals: In addition to learning the fundamentals of biogeochemistry, the goals of this course include:
- Critically reading scientific literature
- Discussing scientific papers
- Develop research and presentation skills

Prerequisites: Principles of Biology II or Environmental Systems Science


Additional readings are provided on NYU Classes in the “Discussion Articles” folder.
**Grades:** The final grade for the class will be calculated as follows:

- Midterm exam - 20%
- Final exam - 20%
- Paper Discussions - 20%
- Annotated Bibliography - 20%
- Presentation - 10%
- Participation - 10%

Letter grades will be determined as follows. If you earn the following scores your grade will be at least as indicated; instructor reserves the right to “curve” the lowest grade upwards as appropriate: 93 and above = A, 90 - 93 = A-, 87 - 90 = B+, 83 - 87 = B, 80 - 83 = B-, 77 - 80 = C+, 73 - 77 = C, 70 - 73 = C-, 67 - 70 = D+, 63 - 67 = D, Below 63 = F, INC = Incomplete, W = Withdrawal. This scale is subject to change based on overall course performance. If you receive an INC, you must resolve the INC before the end of the next semester or it will become an F. It is your responsibility to request an INC in writing before the end of the course.

**Exams:** An unexcused absence from an exam will be calculated as 0% for that particular test! If you miss an exam and present a legitimate excuse, a make-up test will be made available to you. There will be only one opportunity for such an exam; it could be an essay test, and the appropriate instructors will grade it. This situation will be dealt with partly on an individual basis. For take-home exams, failure to turn in the exam on time will result in a deduction proportional to the extra time taken. For example, if you are given 24 hours to complete the exam and hand in the exam 12 hours late the highest grade possible will be a 50%.

**Paper discussions:** There are 11 classes focused on reading peer-reviewed papers, for each of these classes there will be an assignment that supports the reading and must be prepared before class to help facilitate the class discussion. These will be graded based on effort and completion.

**Annotated bibliography:** Each student will conduct a group research project this semester on a biogeochemical topic of their choice. The project requires an annotated bibliography of 10 appropriate sources be completed. Specific guidelines for the project and deadlines are provided on NYU Classes.

**Presentation:** Each group research project will be presented to the class. These presentations provide an opportunity for the entire class to learn a little more about a wide variety of biogeochemical topics. Specific requirements will be shared via NYU Classes.

**Participation:** Students are expected to come to class prepared to discuss the readings assigned for that day. Full participation points are earned by being present and participating in that day's discussion. Participation can be a poll response, verbal comment, adding to the chat, etc. Simply logging into zoom is not sufficient for full credit. Exam and presentation days do not count towards participation. The 4 lowest scores (excused absence, unexcused absence, present but not participating) will be dropped, so there are no excused absences for participation, and documentation for missed classes (except exams) is not required. Assuming no disruptions in the class schedule there will be 24 discussion days with each day worth 1 point, so 20 points will result in 100% for participation. Missing 5 classes for any reason will result in 19/20 or 95%.
Academic Integrity, Plagiarism, and Cheating (adapted from the website of the College of Arts & Science, https://cas.nyu.edu/content/nyu-as/cas/academic-integrity.html):

Academic integrity means that the work you submit is original. Obviously, bringing answers into an examination or copying all or part of a paper straight from a book, the Internet, or a fellow student is a violation of this principle. But there are other forms of cheating or plagiarizing which are just as serious — for example, presenting an oral report drawn without attribution from other sources (oral or written); writing a sentence or paragraph which, despite being in different words, expresses someone else’s idea(s) without a reference to the source of the idea(s); or submitting essentially the same paper in two different courses (unless both instructors have given their permission in advance). Receiving or giving help on a take-home paper, examination, or quiz is also cheating, unless expressly permitted by the instructor (as in collaborative projects).

Disability Disclosure Statement: Academic accommodations are available for students with disabilities. The Moses Center website is www.nyu.edu/csd. Please contact the Moses Center for Student Accessibility (212-998-4980 or mosescsd@nyu.edu) for further information. Students who are requesting academic accommodations are advised to reach out to the Moses Center as early as possible in the semester for assistance.
# Class Schedule

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<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Discussion Topics</th>
<th>Readings (to be completed before class)</th>
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| Week 1 | Feb 1, 3   | **Monday:** Course Introduction and Introduction to Biogeochemistry  
**Wednesday:** Global Cycles of Water and Carbon | Schlesinger and Bernhardt, Chapter 1  
Schlesinger and Bernhardt, 10 and 11 |
| Week 2 | Feb 8, 10  | **Monday:** Ice sheets and climate change discussion  
**Wednesday:** Global Cycles of Nitrogen and Phosphorous | Lenaerts et al. 2019  
Mouginot et al. 2019  
Rignot et al. 2018  
Schlesinger and Bernhardt, Chapter 12 |
| Week 3 | Feb 15, 17, 18 | **Monday:** No Class President’s Day  
**Wednesday:** Project group work  
**Thursday (legislative Monday):** Global Cycles of Sulfur and Mercury | *Project topics*  
Schlesinger and Bernhardt, Chapter 13 |
| Week 4 | Feb 22, 24 | **Monday:** Human impacts of N cycle discussion  
**Wednesday:** Origins | Lassaletta et al. 2014  
Shibata et al. 2017  
Schlesinger and Bernhardt, Chapter 2 |
| Week 5 | March 1, 3 | **Monday:** Coral and climate  
**Wednesday:** The Atmosphere | Lough 2010  
Pretet et al. 2013  
Schlesinger and Bernhardt, Chapter 3  
* Bibliography due 3/3 |
| Week 6 | March 8, 10 | **Monday:** Ozone hole recovery  
**Wednesday:** The Lithosphere | Solomon et al. 2016  
Chipperfield et al. 2017  
Schlesinger and Bernhardt, Chapter 4 |
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<th>Week 7</th>
<th>Monday: <strong>Midterm</strong></th>
<th>Wednesday: The Biosphere: The Carbon Cycle of Terrestrial Ecosystems</th>
<th>Schlesinger and Bernhardt, Chapter 5</th>
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<td>March 15, 17</td>
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<td>Week 8</td>
<td><strong>Monday:</strong> Conservation Agriculture and Carbon</td>
<td>Swanepoel et al. 2018 Kushwa et al. 2016</td>
<td>Schlesinger and Bernhardt, Chapters 6</td>
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<td>March 22, 24</td>
<td><strong>Wednesday:</strong> The Biosphere: Biogeochemical Cycling on Land</td>
<td>Schlesinger and Bernhardt, Chapters 6</td>
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<td>Week 9</td>
<td><strong>Monday:</strong> Face experiments discussion</td>
<td>Norby et al. 2010 Fleischer et al. 2019</td>
<td>Schlesinger and Bernhardt, Chapters 7</td>
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<td>March 29, 31</td>
<td><strong>Wednesday:</strong> Wetlands</td>
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<td>Week 10</td>
<td><strong>Monday:</strong> Methane discussion</td>
<td>Saunois et al. 2020</td>
<td>Schlesinger and Bernhardt, Chapter 8</td>
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<td>April 5, 7</td>
<td><strong>Wednesday:</strong> Inland Waters</td>
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<td>Week 11</td>
<td><strong>Monday:</strong> Pharmaceuticals in wastewater discussion</td>
<td>Padhye et al. 2014 Schaider et al. 2014</td>
<td>Schlesinger and Bernhardt, Chapters 9</td>
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<td>April 12, 14</td>
<td><strong>Wednesday:</strong> Oceans</td>
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<td>Week 12</td>
<td><strong>Monday:</strong> <strong>No Class</strong></td>
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<td>April 19, 21</td>
<td><strong>Wednesday:</strong> Dead zones discussion</td>
<td>Brietberg et al. 2018 Rabalais and Turner 2019</td>
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<td>Week 13</td>
<td><strong>Monday:</strong> Metals in urban agriculture discussion</td>
<td>Paltseva et al. 2020 Säumel et al. 2012</td>
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<td>April 26, 28</td>
<td><strong>Wednesday:</strong> Lead discussion</td>
<td>Pieper et al. 2017 Kim et al. 2011</td>
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<td>Week 14</td>
<td><strong>Monday:</strong> Presentations</td>
<td><em>Annotated Bibliography Due 5/3</em></td>
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<td>May 3, 5</td>
<td><strong>Wednesday:</strong> Presentations</td>
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<td>Week 15</td>
<td><strong>Monday:</strong> Presentations</td>
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<td>May 10</td>
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