

Spring 2020
PGEOG 38306/PGEOG 70506- Ecology of Global Change
Monday 1:10-4 PM
HN 1028

Instructor: Dr. Andrew Reinmann

Office Hours: Monday 11:00 a.m. to 12:30 p.m. HN 1039

Also by appointment at the [CUNY Advanced Science Research Center](#) (85 St. Nicholas Terrace, New York, NY, [5th Floor - Environmental Sciences Initiative](#))

Email: areinmann@gc.cuny.edu (Best method of contact)

When emailing, you should **include the course number in the subject heading**. Every attempt will be made to respond to emails in a timely manner. In general, emails received between 9 a.m. and 5 p.m. on normal workdays will be responded to on the same day, but emails received after 5 p.m. may not receive a response until the following day.

Course Overview

Human activities have introduced a suite of planetary-scale perturbations to the Earth system that have profoundly altered the composition and functioning of ecosystems across the planet. In *Ecology of Global Change*, we will explore the ecological consequences of a wide range of global change phenomena including climate change, land use and land cover change, acid deposition, habitat fragmentation, urbanization, invasive species and environmental pollution. Through a combination of lectures, discussions, reading the primary literature, guest lectures from experts in the field, and an overnight field trip you will become familiar with the seminal and cutting-edge research investigating the effects of global change on ecosystems and their biota, the scientists conducting this research and the methods they use. We will run a 2-night (3-day) field trip to Harvard Forest in Massachusetts to see, firsthand, several world-renowned global change field experiments that have revolutionized the field and our understanding of the ecological impacts of global change. **This trip will occur during spring break.** You will also become familiar with a range of instruments and techniques that are being used for studying ecological impacts of global change. Student evaluation will be based on participation in class discussions, write-ups for readings, exams/quizzes, group research project, and a presentation.

Expected Learning Outcomes

1. Understanding of what global change is
2. Basic understanding of ecological processes

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3. Basic understanding of biogeochemical cycles
4. Understanding of how and why different aspects of global change have an effect on ecological processes and biogeochemical cycles
5. Perform data analysis and interpret ecological data
6. Understanding of how scientists go about studying and quantifying the impacts of global change on ecosystems
7. Developing the skills to comprehend, critique, and write about scientific research

Prerequisites

Students must have passed at least one 100-level science course, or have permission from the instructor. **Proficiency in Microsoft Word, Excel, and Powerpoint is assumed.**

As this is an upper-level/graduate-level course, **I expect well-written assignments.** Communication is an incredibly important component of science, and clear and concise articulation of science will be emphasized in this course. I encourage ALL students to take advantage of the wonderful writing resources available to you at Hunter (<http://www.hunter.cuny.edu/thewritingcenter-cc>) as this will hopefully improve your written communication skills AND your grades on assignments!

Required Texts

There are no required textbooks for this course. Instead, readings will be derived from the peer-reviewed literature. A list of readings will be posted to BlackBoard 1-2 weeks ahead of time.

Classroom Policies

You are expected to have all assignments submitted to BlackBoard or turned in by the due date/time and to have completed all relevant readings before class on that date. Except when relevant to coursework, no electronic devices (e.g., phones, tablets, laptops, etc.) are to be used in class.

Attendance

Because class discussions are central to achieving the learning outcomes of this course, attendance is critical. Therefore, students are strongly encouraged to attend each class and it is the student's responsibility to figure out what was missed during any absence. Additionally, you are responsible for the content covered on the Harvard Forest field trip. If you are unable to attend this trip it is your responsibility to connect with other students in class to find out what you missed. I strongly suggest connecting with at least two students, if possible.

Grades

Grades are based on two quizzes, one final exam, one consumer product presentation, one group research project, participation in class discussions, and write-ups for readings – see

questions to be answered in the Appendix of this document (I will randomly ask you to turn these in at the start of class for credit). Additional criteria for graduate students: 1) different exams, 2) lead discussions for 1-2 of the assigned readings during the semester, 3) separate guidelines for the group project, and 4) a presentation in the field at Harvard Forest.

Exams	50%
Quizzes	20%
Final	30%
Presentation	15%
Group Project	20%
Write-ups for readings	10%
Class Participation	5%

Lectures

Class will meet once each week. The format will be part traditional lecture and part discussion of a particular topic and the assigned readings. Once the weather warms up, we might do mini-field trips to Central Park or other locations nearby to further discuss the ecological processes and aspects of global change covered in class.

Field Trip

In addition to our weekly meetings, I hope to run a 3-day field trip to [Harvard Forest](#) in Petersham, MA. This field trip will provide you with the opportunity to see different ecosystem types that occur in the northeastern U.S., as well as several world-renowned global change research experiments that we will read about in class. Further, during this field trip you will gain experience in making ecological measurements that can be used to understand how global change alters ecosystem processes. **This field trip will occur over spring break from Monday 4/13 – Wednesday 4/15.** Any student who has concerns or questions about the field trip or is unsure they will be able to attend should meet with me before the end of the second week of class (i.e. February 7th). **NOTE: The content of this field trip is a required component of this course and students who cannot come on the field trip will still be responsible for the material covered.**

Exams

The two quizzes will be mostly short answer and will test your knowledge of the material covered during that section of the course. The final exam is comprehensive and will be based on lectures, readings, discussions in class, the field trip to Harvard Forest, and consumer product presentations given by each of you. Exams will begin at the start of class and if you arrive late you will have less time to complete the exam. A missed exam will be graded as a zero and make-up exams will ONLY be available in the case of a documented unavoidable circumstance that results in an excused absence. You are required to notify me if you know ahead of time that you will need to miss an exam for an excused reason.

Consumer Product Presentation

Over the course of the semester you are expected to research the ecological impacts of a consumer product of your choice. However, you need to get prior approval from the instructor. You will present a 7-minute PowerPoint presentation to the class at the end of the semester. In addition, you will need to prepare an abstract (250-word limit) describing the content of your presentation. You will not be given credit for this presentation if the topic did not receive prior approval from the instructor. You will also be required to turn in the slides used for your presentation. Abstracts will be compiled into one document for the first day of presentations. As such, abstracts submitted late will be penalized 50%. The general basis for grading is as follows: Content (50%), Abstract (20%), Overall quality of slides and presentation (30%). The information you include in your presentation must come from at least four peer-reviewed sources (additional references from other reliable sources (check with me) are allowed, but need to be in addition to the four peer-reviewed sources). **NOTE: You will be docked points if your presentation exceeds the time limit, if the format of your references (inserted on the last slide) is incorrect (see required format below), and/or if you do not have the proper number of references.**

Group Project

Undergraduate Assignment: In groups of 4-5, you will research the underlying causes and ecological impacts of some aspect of global change. These reports should conclude with some discussion (1-2 paragraphs) on possible solutions or mitigation strategies. This research paper should not exceed 2,500 words (excluding works cited section and a 250-word abstract), and should clearly articulate the importance of the topic you chose. Readers of your paper should be able to come away from it being able to answer the following questions:

1. What are the main drivers/causes of this aspect of global change?
2. What are some of the major ecological impacts of this aspect of global change?
3. What ecosystems/organisms (if specific organisms are the focus of the effects) are impacted?
4. What is the geographic distribution of the drivers/causes and ecosystems impacted by this aspect of global change?
5. How long has this aspect of global change been a problem (answer this to the extent possible)?
6. What are some possible solutions or mitigation strategies that have been and/or could be implemented?

You must cite at least 10 peer-reviewed papers and appropriately cite ALL information obtained from another source (e.g., scientific paper or other reliable source; see format below). Papers and text missing this crucial information will be considered plagiarized. The general basis for grading is as follows: Content (75%), Writing Quality (25%). **NOTE: You will be docked points if your paper exceeds 2,500 words, if the format of your references (inserted on the last slide) is incorrect (see required format below), and/or if you do not have the proper number of references.**

Graduate Student Assignment: Graduate students are expected to work in pairs and use data from the Harvard Forest eddy covariance flux towers to answer questions about how some aspect of forest growth/health might be responding to environmental change.

Graduate students should talk to me within the first three weeks of class to come up with a specific topic. This assignment should take the form of a scientific paper with an abstract (250-word max) and Introduction, Methods, Results, and Discussion sections. The paper should include at least 15 references from peer-reviewed sources. The paper should not exceed 3,500 words excluding works cited section and abstract. In addition to leading a class discussion on the paper (see description for undergraduate assignment), the graduate students will also be expected to provide a brief overview of the eddy flux system at Harvard Forest during our field trip. The general basis for grading is as follows: Content (70%), Writing Quality (15%), Overall quality of class discussion and eddy flux overview at Harvard Forest (15%). **NOTE: You will be docked points if your paper exceeds 3,500 words, if the format of your references (inserted on the last slide) is incorrect (see required format below), and/or if you do not have the proper number of references.**

Write-ups for Readings:

For each assigned reading from a peer-reviewed source, I expect you to provide a BRIEF (1-3 sentences) answer to each of the following questions. If hand-written, make sure it is legible. NOTE: I will randomly collect these write-ups throughout the semester, but for weeks when there are multiple readings from peer-reviewed sources, I will only collect the write-up from one (your choice for which one to submit).

1. Who wrote the manuscript and what institution are they affiliated with (if multiple authors, focus on the first author)?
2. What is the problem or question being addressed?
3. Why does it matter?
4. What approach did the authors take to answering their question (e.g., observational vs experimental study, field/lab/modeling/remote sensing-based, review, synthesis, etc.)?
5. What are their main findings and take-home messages?
6. Do you think their conclusions are substantiated by the data they present and literature they cite?

General Note on Assignments:

It is your responsibility to submit assignments on time, even if you miss class. Late assignments will be penalized as follows: <1 day = -10%; 1-2 days = 20%; 2-3 days = 30%; >3 days = 50%. **In rare circumstances, I will allow assignments to be submitted late without penalty, but you must speak to me ahead of time.**

Required citation format:

Within text:

Smith et al. (2017) indicate that ozone pollution reduces plant growth.

Ozone pollution has been shown to reduce plant growth (Smith et al. 2017) and impair ecosystem function (Smith and Jones 2016).

In the works cited section:

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Author last name, initials. Year. Paper Title. Full Journal Name Vol:page numbers.
e.g., Smith A.S., Jones, R.B., and LeRoy, S. 2017. Ozone pollution impairs tree growth. *Global Change Biology* 23:121-133.

Syllabus Change Policy

Except for changes that substantially affect implementation of the evaluation (i.e. grading) statement, this syllabus is a guide for the course and is subject to change with advance notice. Any changes to the syllabus will be posted to Blackboard and the instructor will bring changes to the students' attention in class.

Incomplete Policy

I do not give Incomplete (INC) as a final course grade except under extreme and documented circumstances. In order to receive an INC you must be doing passing work at the time of the final exam. Undergraduate students must notify me within 48 hours of the scheduled final exam and also make arrangements with me to complete a Contract to Resolve an Incomplete Grade in which we will establish a deadline for completing missed work and/or examinations. This contract must be completed **prior to final grade submissions**. Graduate students must request the INC within 48 hours of the scheduled final exam. In either case if I do not hear from you within the specified time period I will average your grades and record them.

Hunter College Policy on Academic Integrity

Hunter College regards acts of academic dishonesty (e.g., plagiarism, cheating on examinations, obtaining unfair advantage, and falsification of records and official documents) as serious offenses against the values of intellectual honesty. The College is committed to enforcing the CUNY Policy on Academic Integrity and will pursue cases of academic dishonesty according to the Hunter College Academic Integrity Procedures.

Hunter College Policy on Sexual Misconduct

In compliance with the CUNY Policy on Sexual Misconduct, Hunter College affirms the prohibition of any sexual misconduct, which includes sexual violence, sexual harassment, and gender-based harassment retaliation against students, employees, or visitors, as well as certain intimate relationship. Students who have experienced any form of sexual violence on or off campus (including CUNY-sponsored trips and events) are entitled to the rights outlined in the Bill of Rights for Hunter College.

- a. Sexual Violence: Students are strongly encouraged to immediately report the incident by calling 911, contacting NYPD Special Victims Division Hotline (646-610-7272) or their local police precinct, or contacting the College's Public Safety Office (212-772-4444)
- b. All Other Forms of Sexual Misconduct: Students are also encouraged to contact the College's Title IX Campus Coordinator, Dean John Rose (jtrose@hunter.cuny.edu or 212-650-3262) or Colleen Barry (colleen.barry@hunter.cuny.edu or 212-772-4534)

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and seek complimentary services through the Counseling and Wellness Services Office, Hunter East 1123.

CUNY Policy on Sexual Misconduct Link:

<http://www.cuny.edu/about/administration/offices/la/Policy-on-Sexual-Misconduct-12-1-14-with-links.pdf>

Hunter College ADA Policy

In compliance with the American Disability Act of 1990 (ADA) and with Section 504 of the Rehabilitation Act of 1973, Hunter College is committed to ensuring education parity and accommodations for all students with documented disabilities and/or medical conditions. It is recommended that all students with documented disabilities (Emotional, Medical, Physical, and/or Learning) consult the Office of AccessABILITY, located in Room E1214B, to secure necessary accommodations. For further information and assistance, please call: (212) 772-4857 or (212) 650-3230.

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Tentative Schedule for Spring 2020

Week	Date	Assignment	Topic	Readings
1	Jan 27		Course Overview; Overview of Ecology and Global Change	Vitousek et al. 1997 Schlessinger 2006
2	Feb 3		Anthropocene	Steffen et al. 2007; Crutzen 2002; Guardian Article
3	Feb 10		Biogeochemical Cycles & C and N Cycles	https://en.wikibooks.org/wiki/Ecology/Biogeochemical_cycles ; Guardian Article; Galloway et al. 2008; Bruhwiler et al. 2018
4	Feb 17		NO CLASS: President's Day	
5	Feb 24		Air Pollution & Atmospheric Deposition	Felzer et al. 2007; Hubbard Brook Online Book Chapter; 2 NYT Articles
6	Mar 2	GUEST LECTURER: Pam Templer (Boston University)	Atmospheric Deposition (cont.); Land Cover Change	Decina et al. 2017; Foley et al. 2005; Haddad et al. 2015;
7	Mar 9	GUEST LECTURER: Ian Smith (Boston University)	Land Cover Change: Deforestation & Habitat Fragmentation	Reinmann & Hutyrá 2017; Laurance et al. 1997; Smith et al. 2018; City Lab Article
8	Mar 16	Quiz #1 Dur Midnight, Friday March 20th.	<u>Quiz #1 Lectures 1-6 (excluding land cover change)</u>	
9	Mar 23		Land Cover Change: Deforestation & Habitat Fragmentation (Con't); Urbanization	Grimm et al. 2008; Seto et al. 2012; Groffman et al. 2017
10	Mar 30		Climate Change	Grimm et al. 2013; Walther et al. 2002; Bonan et al. 2009; NYT 2010 Article; NYT Video
11	Apr 6		Climate Change & Extreme Climate Events	Cleland et al. 2007; Bokhorst et al. 2008 ; Rammig 2020
12	Apr 13		Spring Break (Field Trip) CANCELLED ☹	Melillo et al. 2012 ; Reinmann and Templer 2016; Orwig and Foster 1998; Baldocchi 2019; Reinmann and Templer 2018;

				Northern Woodlands Resilient Forest Series, Part 3: Wired Woods
13	Apr 20		Quiz #2 Lectures 6-10 (beginning with land cover change); Invasive Species and Deer	Northern Woodlands Resilient Forest Series, Part 2: Deer; TBD
14	Apr 27	Abstracts Due by 8 a.m.; Group Papers Due by Midnight	Student Consumer Products Presentations	
15	May 4		Student Consumer Products Presentations; Grad Student Group Project Discussions	
16	May 11		Where do we go from here?	America Adapts Podcast; Bastin et al. 2019 (Grad students, read 1-2 responses too)
17	May 18		FINAL	

Red font = No Class; Blue font = Assignment or Quiz; Green highlight= Harvard Forest Field Trip; Bold orange font = paper for which a write-up will be collected