

## Spring 2024

### PGEOG 38306/PGEOG 70506/BIOL 79303-05- Ecology of Global Change

#### Wednesday 11:30-3:20 PM

Classroom: HN 1090B

Instructor: Dr. Andrew Reinmann

Office Hours: Anytime, by appointment via Zoom

In-person options:

@ Hunter HN 1039, Wednesdays 10:30 – 11:30 PM (Times subject to change on days with field trips)

@ the CUNY Advanced Science Research Center (i.e., location of my primary office) via appointment

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

When emailing, you should **include 'EGC' 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 review fundamental ecological concepts and processes and explore the ecological consequences of a wide range of global change phenomena. Topics covered will include climate change, land use and land cover change, acid deposition/environmental pollution, habitat fragmentation, urbanization, and invasive species. We will also discuss important biogeochemical cycles (e.g., carbon, nitrogen, water). Through a combination of lectures, discussions, the occasional field trip, reading the primary literature, group activities, and individual field projects 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. **In addition to our weekly meetings, we will go on a fully funded 3-day field trip to Harvard Forest in Massachusetts during spring break (April 24-26; see details below).** Student evaluation will be based on class participation, write-ups for readings, group/individual assignments, exams, and a presentation.

#### *Expected Learning Outcomes*

1. Understanding of global environmental change and its ecological consequences
2. Basic understanding of ecological concepts and processes
3. Basic understanding of biogeochemical cycles
4. Perform data analysis and interpret data in spatial and temporal dimensions
5. Understanding of how scientists research impacts of global change on ecosystems
6. Developing 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-ce>) 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, scientifically rigorous internet sources, and articles from the popular media. A list of readings will be posted to BlackBoard ~2 weeks before each class.

### *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.

### *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. I strongly suggest exchanging contact information with at least two students, if possible, to connect with in the event you miss a class.

### *Grades*

Grades are based on one quiz, 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** of the assigned readings during the semester, and 3) separate guidelines for the group project.

	<b>Undergraduate</b>	<b>Graduate</b>
<b>Final Exam</b>	<b>25%</b>	<b>25%</b>
<b>Quiz</b>	<b>10%</b>	<b>10%</b>
<b>Paper Discussion</b>	<b>NA</b>	<b>10%</b>

<b>Research Project I</b>	<b>15%</b>	<b>15%</b>
<b>Research Project II</b>	<b>20%</b>	<b>20%</b>
<b>Draft Figures</b>	<b>10%</b>	<b>5%</b>
<b>Paper Write-ups</b>	<b>10%</b>	<b>5%</b>
<b>Class Participation</b>	<b>10%</b>	<b>10%</b>

### *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.

### *Final Exam*

The final exam is comprehensive and will be based on lectures, readings, discussions in class, group projects, and the consumer product presentations given by each of you. Exams will be a combination of multiple choice, short answer, and essay questions. A missed exam will be graded as a zero and a make-up exam 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 the exam for an excused reason.

### *Research Project I*

*Geospatial analyses, remote sensing data, big data, and modeling are important and widely used research tools for studying ecological impacts of global change and thus critical skills to develop as part of your training as environmental biologists. Through this research project you will learn basic skills in applying these tools to understanding how the distribution of different forest types is mediated by climate and, by extension, how climate change might alter the distribution of our forests. NOTE: You do not need prior experience with any of these tools to carry out this assignment.*

Climate conditions are important determinants of ecosystem type—and its component species—that occur in a given location. While New York’s fairly wet climate and growing season length support forests as the dominant native ecosystem type, the type of forest can vary across the state. During the course of the semester, you will conduct a suite of analyses using GIS, remote sensing, and forest inventory products to deepen your understanding of the relationships between climate and forest tree species composition in New York State. These analyses will help to provide insight into how we might expect the tree species composition of our forests to change as our climate continues to warm. While prior experience with GIS will be helpful, it is not necessary as a tutorial for the assignment will be posted to Blackboard. The details of this assignment will be described in a posted to Blackboard. From this research, you will be required to make a series of maps and graphs and write a mini research paper in the format of a Results section of a scientific manuscript. The tools and data sources you will use for this project include QGIS (download QGIS at <https://www.qgis.org/en/site/>), ClimateEngine.org, The National Land Cover Database (<https://www.mrlc.gov/data>), and The US Forest Service Forest Inventory and Analysis program (<https://www.fia.fs.fed.us/>).

## *Research Project II*

During our field trip to Harvard Forest, we will set up a new experiment and collect data that will serve as the foundation of a long-term data set collected by students in future Ecology of Global Change courses! During this trip, we will discuss approaches to experimental design and data collect, and learn how to identify tree species, install ecological/environmental sensors, and quantify different aspects of forest structure and carbon storage. You will then use the data collected to learn how to analyze ecological data and write a scientific paper that includes an Abstract as well as Introduction, Methods, and Results sections. Data analyses and the final paper will be a group exercise where you will choose two other students to work with. Details about this project will be posted to BlackBoard.

## *Write-ups for Readings:*

For each assigned reading from a peer-reviewed source (i.e., not website or popular media readings; indicated by "\*" on the syllabus below and the Reading List), I expect you to write a BRIEF (1-3 sentences) answer to each of the following questions. NOTE: While I will only collect these randomly, they will help facilitate discussion in class and there will be a question on the Final Exam that requires you to revisit your write-up for one or more of these readings.

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?

## *Questions for Guest Lecturers:*

Over the course of the semester, we will have several guest lecturers join us to discuss their research and/or the work they do, as it relates to the topic covered in class. Ahead of their lectures, you will be assigned one of their papers or a paper related to the topic they will discuss. These guests provide a great opportunity to learn more about the cutting-edge global change research being conducted and about the different career trajectories people take. To facilitate discussion after each presentation and to maximize the benefit of these presentations to the class, I want everyone to come up with 2-3 questions ahead of class to ask each of our guest lecturers. I will collect these and this will count towards your class participation grade, but the main point is to make for a fruitful discussion, so please take this seriously.

## *General Note on Assignments:*

It is your responsibility to submit assignments on time, even if you miss class.

**Assignments that are turned in late will be penalized as follows: <24 hours = -5%; 24-48 hours = -15%; -5% for each day late after that (e.g., 48-72 hrs late = -20%, 72-**

**96 hrs late =-25%, etc.).** *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 for all assignments requiring references. You will lose points if you do not carefully follow this format. Let me know if you have questions!**

Internally:

One author: "The sky is blue (Smith, 1997)."

More than 2 authors: "The sky is blue (Smith et al., 1997)."

Literature cited section:

One author:

Smith AS. 1997. Detailed study of sky color. *Journal of Obvious Things* 3: 122-126. (note that the volume AND page numbers are included and that the journal title is in italics)

Multiple authors:

Smith AS, Rogers LM, White SD. 1997. Detailed study of sky color. *Journal of Obvious Things* 3: 122-126.

***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, on 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](mailto:jtrose@hunter.cuny.edu) or 212-650-3262) and Colleen Barry ([colleen.barry@hunter.cuny.edu](mailto:colleen.barry@hunter.cuny.edu) or 212-772-4534) 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.

### **Preferred Gender Pronoun**

All people have the right to be addressed and referred to in accordance with their personal identity. In this class, we will have the chance to indicate the name that we prefer to be called and, if we choose, to identify pronouns with which we would like to be addressed. I will do my best to address and refer to all students accordingly and support classmates in doing so as well.

**PGEOG 38306/PGEOG 70506/ BIOL 79303-05 - Ecology of Global Change****Tentative Schedule for Spring 2024****(NOTE: Refer to reading list each week for required readings)**

Week	Date	Assignment	Topic	Readings
1	Jan 31		Course Overview; Introduction to Ecology and Global Change	Biomes Web Reading; Sage 2020; Vitousek et al. 1997; Schlessinger 2006.
2	Feb 7		'How to Read a Scientific Paper'; Barriers to inclusion in ecology and envi science; The Anthropocene	Corlett 2015; Popular media articles; Ruben 2016; O'Brien et al. 2020; Custom Reading; Sage 2020 (con't)
3	Feb 14		Ecosystem Processes and Biogeochemical Cycles	Fahey; *Galloway et al. 2008; Bruhwiler et al. 2018 (p.43-55); Moore and Crowell 2014
4	Feb 21	<b>Quiz</b>	Quiz; Air Pollution and Acid Rain	Dirscoll and Fakharaei; *Felzar et al. 2007; NYT articles
5	Feb 28		<b>NO CLASS, Friday Schedule</b>	
6	Mar 6		Climate Change	TBD
7	Mar 13		Climate Change	TBD
8	Mar 20		Climate Change (Guest Lecture: Hanna Makowski)	TBD
9	Mar 27		Land Cover Change: Deforestation & Habitat Fragmentation	TBD
10	April 3	<b>Research Project 1</b>	Land Cover Change: Forest Fragmentation (Guest Lecture: TBD)	TBD
11	Apr 10		Urbanization	TBD
12	Apr 17		Urbanization	TBD
13	Apr 24-26	<b>Harvard Forest field trip!!</b>	<b>Natural history hikes, visit field experiments, set up new experiment and collect data, meet scientists</b>	Reinmann NSF Proposal; TBD
14	May 1	<b>Research Project II: Draft Figures (by midnight on May 3<sup>rd</sup>)</b>	Invasive Species (Guest Lecture: Kelsey Parker)	TBD
15	May 8		Where do we go from here? (Guest Lectures TBD)	TBD
16	May 15	<b>Research Project II (by midnight on May 19<sup>th</sup>)</b>	<b>TBD</b>	
17	May 22		<b>FINAL</b>	

Red font = No Class; Green font = Guest Lecture (Come with questions); Blue font = Assignment due  
 (NOTE: Dates are subject to change with prior notice); \* indicates readings for which a write-up is required (collected at random at the start of class); Yellow highlight = Exam or field trip