

**PGEOG 25100- Spring 2025**  
**Earth System Science II**  
**Lecture Instructor: Professor Randy Rutberg**  
**Lab Instructor: Dr. Geoffrey Fouad**

**CLASS SCHEDULE:**

LECTURES: Monday/Thursday 11:30 AM to 12:45 PM  
LABS: TBA

**PROFESSOR RUTBERG CONTACT INFORMATION:**

**Office** 1043 Hunter North and by Zoom  
**E-mail** [rrutberg@hunter.cuny.edu](mailto:rrutberg@hunter.cuny.edu) (\*)  
**Tel.** 212-772-5326 (NA for spring 2024)  
**Office Hours:** Following class and by appointment

**LAB INSTRUCTOR CONTACT INFORMATION: Dr. Geoffrey Fouad**

**Instructor** Dr. Geoffrey Fouad  
**Office** 1045 Hunter North  
**Office Hours:** see lab syllabus

\* **Note:** the best way to contact us is via email: (1) You must include the course name or number in your subject line. (2) You must include your entire name as it appears in CUNYfirst in your email. We will try to answer all emails within 24 hours. Allow for a 48 hour delay on the weekends.

*Except for changes that substantially affect implementation of the evaluation (grading) statement, this syllabus is a guide for the course and is subject to change with advance notice. Updates will be posted regularly on Brightspace.*

**PREREQUISITES**

Each of you must have passed the first part of this two-course sequence (PGEOG 25000), or have permission of the instructor

**REQUIRED TEXTBOOKS**

Students must obtain their own copies of:

Kump, Kasting, and Crane, 2010, *The Earth System*, (3<sup>rd</sup> edition preferred), Pearson/Prentice Hall Publishers. ISBN-10: **0321597796** | ISBN-13: **978-0321597793**

This book has been ordered at the Hunter College bookstore and at Shakespeare and Company

Bryson, Bill, *A Short History of Nearly Everything*, Broadway Books, 2004, ISBN10: 076790818X

**ADDITIONAL READINGS AND LAB MATERIAL** will be provided, including lab exercises that have been designed specifically for this course

\*\*this list may be updated prior to course start date

## **COURSE DESCRIPTION AND OBJECTIVES**

This course is the second part of a two-course sequence. Here, we continue the objectives of the PGEOG 25000, and learn about our planet as a system of interacting components, including the atmosphere, the hydrosphere, the lithosphere, and the biosphere. This course, the second one in the sequence, has a greater focus on the biosphere than the first course. The course will consist of four sections: Earth Evolution, Ecology, Climate, and a special topic featuring recent research in a related area.

The five main objectives of this course are:

1. To further your understanding of “systems thinking” in the context of the Earth system. Systems thinking is critical in all areas of study, and particularly in the fields of environmental studies and earth sciences. The second course of the sequence has a greater focus on the biosphere.
2. To expand your skills in quantitative analysis. In the lab portion of this course we will continue to learn concepts necessary to study environmental systems in a quantitative fashion. Labs are meant to provide you with a number of identifiable skills that can be applied in other courses as well as in work environments. The second course of the sequence will expand on the systems modeling work, and in addition, will focus more on introductory concepts in chemistry and statistics.
3. To provide you with a sufficiently broad, yet integrated, understanding of the earth system to identify particular areas or sub-disciplines that you would like to pursue in more detail.
4. To develop your writing and presentation skills so that you can clearly communicate scientific concepts and processes.
5. To introduce you to exciting topics, problems and questions in modern Earth Science.

## **EXPECTED LEARNING OUTCOMES**

### **1. Theory**

At the end of the semester, you will be expected to be able to:

- Describe the evolution of the Earth System
- Understand basic ecological processes and ecosystem interactions
- Synthesize how processes function together to determine and regulate Earth’s climate.
- Analyze and describe a modern topic (TBA) in Earth System Science.

### **2. Skills**

At the end of the semester, you will be expected to have acquired basic quantitative skills that will allow them to

- Apply basic mathematical calculations to quantify physical processes under study;
- Visualize data and explain graphs and charts in detail;
- Perform calculations and generate charts using basic computer software such as EXCEL to gain a basic appreciation of modeling environmental systems through the use of the STELLA software; and
- Gather, organize and synthesize scientific data and literature
- Write/present clearly and concisely to communicate scientific concepts and processes.

## COMPUTER LABS

Computer labs are scheduled once per week. Labs will consist of exercises designed to introduce you to some of the concepts and skills necessary to study environmental systems in a quantitative fashion. These include basic mathematical concepts, as well as using computer simulations, or models, to understand the Earth from a “systems dynamics” perspective. STELLA® modeling software will be used in modeling exercises. No previous experience in computer modeling or STELLA software is expected, although basic familiarity with the Windows operating system, MS WORD and MS EXCEL, is expected. Computer labs will be provided to you.

**NOTE:** a greater emphasis will be placed on analysis of data and results.

Please see the lab syllabus for detailed instructions.

Be sure to read the lab guidelines found on the Course Information page. This document gives detailed instructions about how labs are to be structured as well as a grading rubric.

## GRADES

|   |     |                 |
|---|-----|-----------------|
| Article readings assignments/Voicethreads/other |     | 15% (15 points) |
| Problem sets:                                   | 15% | (15 points)     |
| Labs  | 30% | (30 points)     |
| 3 exams   | 30% | (15)            |
| Independent project                             | 10% | (10)            |

Up to an extra 5% for outstanding class participation (contributions to live discussions and/or comments on Voicethreads/Discussion Boards/corrections)

## EXAMS

The exams will be based on the material covered in class, in the textbook and concepts that are learned through the lab portion of the course. The exam dates are CLEARLY posted in the syllabus of the course. The dates are set from day one and cannot be changed. Three exams will be given. See the syllabus for exam dates and information about which chapters will be covered. You must follow the upload instructions. If you do not follow the instructions and your submission is cumbersome to grade, you will receive a zero.

### **About examinations and grades:**

- Grades follow Hunter’s grading system:  
<http://catalog.hunter.cuny.edu/content.php?catoid=15&navoid=1433>. Grades will be curved at my discretion.
- Examinations are 1 hour and 15 in length. If you arrive late, you lose that time.
- Your exams must be written legibly using complete sentences, spelling and proper grammar. If you have a hand writing issue, practice. I cannot grade what I cannot read.
- Make-up exams are ONLY available in extreme cases, and students must provide documentation of the reason for missing the exam (medical or other forms)
- I will automatically agree to the CR/NC option ONLY if the conditions stated in the CR/NCR form are satisfied: all course work has been completed and you earned grades such that you accumulate at least 50 points total in the course (this includes labs plus exams plus extra, if you earned any).

Students on probation are not eligible for this option. Students must see me during office hours before the last day of class to discuss this option. Requests for CR/NC as a final grade will not be accepted during or after the final exam.

**Assignments:** All assignments must be submitted to Brightspace or Gradescope by the beginning of class on the due date specified. Your assignments must be typed or written very neatly. If I cannot read it, I cannot grade it. Assignments will be graded according to rubrics posted on BRIGHTSPACE/Gradescope.

Group work is required for (some) problem sets and class work. However, group work does not mean that each member completes a single problem on their own and then the various problems are combined in a single document. The problem sets are intended to help you learn. Therefore, you all need to understand **all** the problems. Ideally, all group members should complete all the problems and then check their work against one another. When applicable, use the “add group member” option on Gradescope so that group work is graded as a group assignment.

When you upload assignments to BRIGHTSPACE, the document name must have the following format:

Lastname\_firstname\_assignmentname\_ESS2\_2025.doc

Examples:

Rutberg\_Randy\_HW#1\_ESS2025

Rutberg\_Randy\_HW#2\_ESS2025

This naming rubric helps me keep track of student work. If you do not name your documents as specified above, I do not guarantee that they will be graded.

In addition, within the document itself, you must include your full name, assignment title and any other students with whom you worked.

**Article Assignments:** Article assignments are intended to broaden and deepen your knowledge of Earth System Science and help you apply your analysis skills. Articles will be read using the Hypothesis tool. Students are expected to annotate the article (instructions will be provided) and participate in the related discussion, online and in class.

**Independent Project:** The independent project will require you to combine knowledge and skills that you have learned in this class. Students will select a topic (if not done in PGEOG 250), obtain my approval, use a publicly available database to gather data, read 5-10 background papers and then create and present a lightning talk (5 minute) on their project as well as turn in a one-page summary. This project is intended to be worked on over the course of the semester. Opportunities for posting progress, sharing research strategies and getting feedback will be available.

**Tardiness in handing in assignments and labs:**

Lecture assignments will be posted early and will be penalized if submitted late. The reason for this is that students need to receive timely feedback. I can't provide feedback before all assignments have been turned in. All assignments will be posted at least two weeks before the due date. I recommend you complete the assignments as soon as possible so that unexpected circumstances do not derail you. If you

feel that you have exceptional circumstances that warrant an extension, you must meet with me during my office hours to discuss your situation. See lab syllabus for lab policies.

**Classroom policies:** You are expected to have read the reading listed for each class day *before class on that date*. There is no texting permitted in the classroom. Please try to turn off all distractions when we meet virtually (all messaging, email, etc.). If you want to get the most out of this class, you will need to pay attention. In addition, though we need to be mindful of our carbon footprint on Zoom, I would like to have all cameras on for some portion of the class to build community. If you are unable to do this, please be sure to load a photograph in your Zoom profile so we don't just have to look at a black square. I encourage you to post a professional photograph, i.e. one that you would use on a job application or other professional situation.

*The professor reserves the right to alter or add topics and assignments as needed.*

## **ATTENDANCE**

Attendance is critical to learning. Attendance is required, but it is up to you show up.

## **HELPFUL INFORMATION**

**My Teaching Philosophy:** My goal in teaching is to help you become confident and responsible professionals and to make this experience an enjoyable one. My approach to teaching involves being a facilitator in the learning process as opposed to being the authoritarian lecturer at the front of the room with a “one-way information transfer” style. I understand and respect individual differences in learning and do my best to promote learning in the classroom by working with individual differences rather than against them. At the same time, I wish to impart technical skills and a sense of responsibility by encouraging you to play the role of professionals in the classroom.

I expect you to put your best effort in this course. This involves participating in the in-class exercises, reading the assigned material, doing the homework, editing when necessary until they are clear and correct, and preparing for quizzes and exams.

**Lecture:** I will spend part of the lecture time explaining the key concepts of Earth systems and earth science and discuss, when appropriate, solution of problems. You are expected to devote time outside the classroom to understand the concepts, and review questions given at the end of chapters in the textbook, or questions that I may ask in class. You should plan on spending at least 5 hours each week reading and studying the material and completing assignments. I expect that lectures will give you a clear idea of what is expected in quizzes and exams.

**Finally:** It is important to start with a good study habit. Consistency is the key. Forming study groups is extremely helpful. Use my time and any resource available to you throughout the semester. Make progress steadily as the material in this course cannot be understood the night before the exam. Concentrate on understanding rather than ‘regurgitating’. Put out your best effort every day!

The following are useful tips to do well in this or any class:

- Attend class and take detailed notes.
- Read the assigned material in the text (or other) *before* coming to class.

- Re-write your notes as soon as possible after class. This will allow you to fill in the details still fresh in your memory, and prepare questions for the next time the class meets.
- Test yourself by answering the questions at the end of each chapter.
- Carefully study the diagrams and charts in the book and in the lectures.
- Read the rubrics associated with the assignments so that you understand the expectations.

**A Tentative Syllabus is provided below – an updated version will be available at the beginning of the semester from the course website and Brightspace (look for file schedule.pdf). Syllabus gets updated throughout the semester, as needed. Check regularly for updates.**

**TENTATIVE COURSE SCHEDULE  
EARTH SYSTEMS SCIENCE I – PGEOG25100 SPRING 2024  
Department of Geography, Hunter College**

**Lecture Instructor:** Prof. Randy Rutberg

**Tentative Syllabus** Readings specified by chapter, with no author (e.g. “Ch. 9: The Biosphere and Biodiversity”) refer to the main text of the class (Kump, Kasting, and Crane) which the students are expected to have. Other readings, specified by author, are supplied as pdf files.

| <b>Date</b> | <b>Day of Week</b> | <b>Class Material</b>                                     | <b>Assignment</b>  | <b>Reading (chapter reading due prior to class meeting, article reading due as specified)</b> |
|-------------|--------------------|---|--|---|
| Jan. 27     | Monday             | Ice Breaker & Brainstorm<br>Formation of the elements     | In class discussion, surveys and exercises, <a href="#">Extra Credit – proposal revision</a> | PDF on BRIGHTSPACE - readings that complement lecture   |
| Jan 30      | Thursday           | Origin of the Elements<br>Online reading, Chapter 10 Kump |  | PDF on BRIGHTSPACE-- readings that complement lecture,  |
| Feb. 3      | Monday             | Origin of Life on Earth<br>Chapter 10 Kump                | # HW 1 assigned - Origin of Life   | Article 1- Lost City -due Feb 5   |
| Feb. 6      | <b>Thursday</b>    | Evolution of reduced carbon reservoir                     |  |   |

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| <b>Feb. 10</b>     | Monday              | Effect of Life on the Atmosphere (Ch.11)                | #1 due<br>Extra Credit Proposal Rev. due |  |
| Feb. 13            | Thursday            | Effect of Life on the Atmosphere, Chp 11 Kump           |  |  |
| Feb. 17            | Monday              | College Closed  |  |  |
| Feb. 18 (Tues)     | Monday at Hunter    | Metabolism, Ecosystems and Biodiversity (Ch. 9),        | HW 2 assigned- Biodiversity data         |  |
| <b>Feb 20</b>      | <b>Thursday</b>     | Metabolism, Ecosystems and Biodiversity (Ch. 9),        | Monday Schedule                          |  |
| <b>Feb. 24</b>     | Monday              |   |  |  |
| February 27        | Thursday            | Biodiversity through Earth's History (Ch.13),           | HW 2 due                                 | Article 3-KT mass extinction, due March 7  |
| March 3            | Thursday            | Biodiversity through Earth's History (Ch.13)            |  |  |
| March 6 (Thursday) | Wednesday at Hunter | Human threats to biodiversity (Ch 18                    | Article 3 – KT extinction due            | Article 4- Biodiversity loss, due March 16 |
| <b>March 10</b>    | <b>Monday</b>       | <b>Exam 1</b>   |  | <b>Begin 8 week research project</b>       |
| March 13           | Thursday            | Earth Evolution – Long- term climate regulation (Ch.12) | HW 3 assigned - Milankovich              |  |
| Mar. 17            | Monday              | Earth Evolution – Long- term climate regulation (Ch.12) |  |  |
| <b>Mar. 20</b>     | <b>Thursday</b>     | <b>No classes scheduled</b>                             |  |  |
| Mar. 24            | Monday              | Pleistocene Glaciations (Ch.14),                        |  |  |
| Mar. 27            | Thursday            | Pleistocene Glaciations (Ch.14)                         | HW 3 due                                 |  |
| <b>Mar. 31</b>     | <b>Monday</b>       | <b>No Classes Scheduled</b>                             |  |  |
| April 3            | Thursday            | Pleistocene Glaciations (Ch.14)                         |  |  |
| April 7            | Monday              | Global warming Part 1 (Ch. 15)                          | HW 4 assigned –                          |  |
| Apr. 10            | Thursday            | Global warming Part 1 (Ch. 15),                         |  |  |
| <b>Apr. 14</b>     | <b>Spring break</b> | <b>No Classes Scheduled</b>                             |  |  |
| <b>Apr. 17</b>     | <b>Spring break</b> | <b>No Classes Scheduled</b>                             |  |  |

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| Apr. 21  | Monday              | Global warming Part 1 (Ch. 15), | HW 4 due<br># 5 assigned<br>(tentative) |                       |
| Apr. 24  | Thursday            | EXAM 2                          |   |                       |
| Apr. 28  | Monday              | Global warming Part 2 (Ch. 16)  |   |                       |
| April 24 | Spring Break        | Global warming Part 2 (Ch. 16)  | # 5 due                                 |                       |
| April 29 | Spring Break        | Special topic. TBA              | Annotations                             |                       |
| May 1    | Thursday            | Special topic TBA               | Annotations                             | Supplemental Readings |
| May 5    | Monday              | Special topic TBA               | Annotations                             | Supplemental Readings |
| May 8    | Thursday            | Special topic TBA               | Annotations                             | Supplemental Readings |
| May 12   | Monday              | Research Presentations          |   | Supplemental Readings |
| May 15   | Last Day of Classes | Research Presentations          | Last Day of Class                       | Supplemental Readings |
| TBA      | Final Exam          |                                 |   |                       |
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General Research Project Schedule:

- March 11. – Develop Research Question
- March 18 – Develop Ideas for your paper
- March 25 – Find references, create annotated bibliography
- April 4 – Develop your thesis
- April 11 – Integrate source material and develop your idea/contribution
- April 18 – Identify main points, refresh your thesis
- April 25 – Draft outline, write first draft – consider bringing it to office hours for review
- May 2- Revise first draft, refresh thesis if necessary
- May 9– Final revisions, presentation preparation
- May 11 - Research Presentations
- May 12 - Research write up due



## **As with all courses at Hunter College:**

### **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. See the following report by the Hunter College Senate for more details: <http://www.hunter.cuny.edu/senate/assets/Documents/Hunter%20College%20Policy%20on%20Academic%20Integrity.pdf>

### **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 educational 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, in Room E1214B, to secure necessary academic accommodations. For information and assistance: (212)772-4857 or (212)650-3230.

### **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) of Colleen Barry ([colleen.barr7@hunter.cuny.edu](mailto:colleen.barr7@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.hunter.cuny.edu/diversityandcompliance/title-ix>

### **Personal Identity**

"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."