

## ENVR 374 | Planetary Ecology: Climate Science & Climate Solutions Spring 2025

**Course Instructor: Dr. Franklin Bailey Green**  
**CYA Email: [bailey.green@cyathens.org](mailto:bailey.green@cyathens.org)**

### Course Description

This course is about planet Earth, its climate, and the co-evolution of life and most recently of *Homo Sapiens*. Robust and resilient, yet precious and fragile, Earth and its variable climate have both sustained and threatened the development, flourishing, and survival of human societies. We will examine how well connected and how delicately balanced Earth and its interconnected climate systems really are. We will study the causes and consequences of abrupt, gradual, and accelerating climate change with particular interest in global warming over the past fifty years. We will understand why we need the “headlights” of science to see what lies ahead and to guide our adaptation, discovery, and development of solutions to slow and reverse the causes and consequences of global warming. We will examine a range of solutions and how we might harness innovation, collaboration, and the political will to implement sustainable solutions at the local, regional, national, and global scales and on individual, societal, national, and international levels with intelligence, cooperation, and compassion.

Using the framework of the recent documentary film, “**Breaking Boundaries: The Science of Our Planet,**” we will explore nine planetary systems that indicate the health of planet Earth. We will investigate if and how we have left the *Holocene*, the last geologic epoch when human societies flourished during a period of stable climate and learn how we entered—perhaps unwittingly—the *Anthropocene*, our new geologic epoch that has been marked by steadily increasing global average temperatures and increasing severe and frequent extreme weather events. As we consider climate risks, we will also explore climate solutions both from a global environmental or “planetary” perspective and from an individual, societal, and environmental health perspective.

### Course Approach

There are no prerequisite courses. Students from all disciplines are welcome. In this interdisciplinary seminar, we will learn together about the fundamental causes and consequences of global warming as well as the many available and newly emerging solutions to slow and reverse global warming.

We will explore climate science and climate solutions through three primary texts, three documentary films, TED Talks, climate journalism, seminar discussions, and guest lectures. Each of these three books provides an excellent beginning of our study of climate, water, and soil (agriculture). From these three authors, we will meet many more climate scientists, journalists, and climate activists, and climate solution practitioners. This course will deepen our understanding and engagement with the preservation of our planet home during our present climate crisis.

In our twice weekly seminars, students will discuss the reading assignments, documentary films, guest lectures, current climate journalism and take turns leading class discussions. Students will submit short, 500- to 1,000-word weekly reflections at the end of each week, and a 10-12 minute presentation at the end of the course on a topic that they have been following throughout the semester. Each of these assignments will contribute to our achievement of the following learning objectives and learning goals.

### Learning Objectives

#### The learning objectives of the course will enable students to:

- Identify and distinguish the climatic differences between the Holocene and the Anthropocene epochs;
- Appreciate the interconnections between climate stability and the development of human civilizations and between climate instability and the destruction of human civilizations;
- Understand the sources, mechanisms, and consequences of global warming, increasing greenhouse gas (GhG) emissions, heat transfer, thermohaline circulation (THC), rain bombs, atmospheric rivers, and atmospheric circulation;
- Identify the interconnections among climate, weather, water, energy, food, health, security, and human migration;
- Understand the interconnections, risks, and mutually reinforcing solutions among nine planetary systems including climate, the water cycle, oceans, biomes, biodiversity, nitrogen and phosphorus cycles, the atmosphere, the ozone layer, and air pollution; and,

- Understand and appreciate the importance of the water cycle, saline and freshwater stocks and flows, rainfall intensity and duration, runoff and geomorphology, aquifers and groundwater recharge, eutrophication, safe drinking water, sanitation, human health, environmental health, and ecosystem services.

Other learning goals will enable students to:

- Analyze documentary films that address global warming, tipping points, and mutually reinforcing solutions;
- Understand and be able to apply sustainability metrics, and techno-economic assessments, life cycle assessments, and life cycle costs;
- Recognize and differentiate industrial agriculture and regenerative agriculture in terms of soil health, fertility, nutrition, climate, environmental health, human health, and global health;
- Compare and contrast linear and circular economies, as well as hard and soft energy paths;
- Investigate, evaluate, and consider climate practices and solutions that reduce, eliminate, and draw down atmospheric concentrations of greenhouse gases (GHG) emissions and decarbonize economies and lifestyles by an increasing the use of renewable energy, nature-based solutions for water, and planet friendly diets;
- Understand and appreciate the work of climate scientists, their materials & methods of inquiry and study, the observations, measurements, data, findings, recommendations and advocacy;
- Evaluate climate science and climate solutions; and,
- Envision a career in environmental science, engineering, infrastructure management, education, policy, regulation, justice, diplomacy, journalism, and activism and how these might fit with your chosen major.

## Course Requirements

Students will be required to read carefully and critically, or listen to, three books. Students will also be required to watch and study at least three or four required documentary films. If we can find some extra time, we may try to add one or two additional documentary films in between our three climate science books. We may also host a climate and environmental film series open to the CYA student body. You may be asked to present a short synopsis of the key concepts and connections presented in the required readings and/or film.

This course will be conducted as an upper-level undergraduate seminar and graded accordingly.

**Weekly Written Reflections 30%** -- Students will be required to write a short weekly reflection on the week's readings, documentary films, and class discussions. These written reflections should be 500 to 1,000 words: 1 to 2 pages single spaced 12-point font size in Word. These weekly reflections will be due each Friday by 5:00pm. Please attach and send your weekly reflections in Word to an email addressed to me at: [bailey.green@cyathens.org](mailto:bailey.green@cyathens.org). You will be graded primarily on the quality of your thoughts and reflections upon the readings, films, climate journalism, and class discussions of that week. Your reading notes and questions will enhance your class participation and will be useful in your weekly reflections. Students will be encouraged to follow a specific climate-related topic about which they are interested and intrigued in multiple news outlets and peer reviewed journals. Students' individual climate journalism topics must be proposed to, discussed with, and approved by the Professor. These individual topics will be presented during our final two classes of the semester.

**Class Contributions 30%** -- Education is both an individual and a social enterprise. Your class contributions will account for 30% of your final grade. Your class contributions grades will reflect your being on time, prepared, attentive, and fully engaged in our class discussions and presentations. Assignments of book chapters and documentary films are to be completed before the class session during which they will be discussed. Short quizzes on key concepts, terminology, and interactions may be given periodically and evaluated as a measure of your engagement and mastery of the materials. I expect you to come prepared to engage in and contribute to class discussions. Class discussions will provide students with opportunities to raise questions, to clarify complex mechanisms, and to comment on the readings, films, articles. I expect everyone to engage and discuss in a collegial, collaborative atmosphere of mutual respect. We will learn together with and from each other, and our smaller class size will be ideal for a seminar. You will find that you learn more when you are well prepared and actively engaged in class discussions. You will also learn through tracking a climate topic through your review of journalism and peer-reviewed literature. Please feel free to speak with me during office hours or by email if any difficulties arise for you with your weekly reflections, class contributions, and independent research for your final presentations.

**Final Class Presentations 40%** -- At the end of the semester, each student will make a 10- to 12-minute presentation. We will be discussing these throughout the semester. They may draw upon any of our course resources

listed below as well as from your own climate journalism review and independent research. You may produce handouts, use a powerpoint presentation and other enhancements to your selected climate impact and solutions.

## CYA Attendance Policy

CYA regards attendance in class and on-site (in Athens or during field trips) as essential, so attendance at all scheduled meetings is required. All absences will be recorded, and they may affect one's grade. If you are unable to come to class for any reason, please let me know beforehand, if possible.

## CYA Policies and Regulations

### Academic Accommodations

Students are requested to submit an official letter from the office at their school that handles academic accommodations, for instance, the Office of Disability Services, or to have that office send a letter to CYA. Students who have submitted such a letter to CYA should also submit a copy to and discuss with me how these accommodations would work best in this course.

### Accessibility

The class meetings for this course will be held on the CYA campus. This course will require students to read, listen, watch, and engage in discussions and periodically give brief climate journalism updates.

### ePolicy on Original Work

Plagiarism is literary theft. As such, it is a serious offense which will not be tolerated either at your home institution or at CYA. Plagiarism on an examination or in a paper will result in an F for the course. You must cite the author of any and all ideas that you use that are neither common knowledge nor your own idea. If you are in doubt, it is safest to cite the source. Your work should be original and reflect your own ideas and thoughts. If you are unsure about what counts as original work, please check the Student Handbook. If you are uncertain, please consult with me.

### Use of Laptops and cell phones

In-class use of laptops or tablets will be permitted for the express purposes of note-taking. Cell phones may not be used in class.

### Upgrade to 400-level course

Courses may be easily upgraded to a 400-level. Doing so typically adds approximately 25% additional work on the part of the student. The option to upgrade opens the second week of classes. If you are interested in this option, please talk with me.

### Required Readings

Linden, Eugene. (2006). The Winds of Change: Climate Weather, and the Destruction of Civilizations, New York, NY: Simon & Schuster Paperbacks, pp. 319.

Gleick, Peter. (2023). The Three Ages of Water: Prehistoric Past, Imperiled Present, and a Hope for the Future, NY: PublicAffairs, Hatchette Book Group, pp. 356.

Montgomery, David R. (2012). Dirt: The Erosion of Civilizations, Berkeley, CA: UC Berkeley Press, 10 chapters, approximately pp. 285.

### Spring 2025 Schedule

Day #	Date/Day	Topic / Assignments Due
1	Jan 28	Introductions, Course Overview, Learning Objectives, Expectations, and Assignments including Required Readings, Documentary Films, Climate Journalism & peer-reviewed literature, weekly written reflections followed by our beginning to watch climate documentary Film One (F1) "Breaking Boundaries: The Science of Our Planet" (also available on Netflix) and begin and your outlining of the nine interconnected planetary systems each in their various stages of safety, risks, dangers, & potential consequences
2	Jan 30	Complete watching (F1) "Breaking Boundaries" and outlining the nine interconnected planetary systems; and, discuss F1 / write your first weekly reflection and submit by Friday, September 13 <sup>th</sup> at 5pm
3	Feb 4	"Opening Arguments" in <u>The Winds of Change: Climate, Weather, and the Destruction of Civilizations</u> Preface & the first half of Part One (pp. 1-40) B1-#1, and write your weekly reflection and submit by or

Day #	Date/Day	Topic / Assignments Due
		before Friday, Sept. 20 <sup>th</sup> at 5pm, and thereafter by each Friday at 5pm, or before, throughout the Fall Semester; decide about upgrading to a 400-level course
4	Feb 6	Guest Speaker Dr. Andrew Gunther, via Zoom beginning at 8pm-9:35pm (rather than our regular class time) and discuss B1-#2 / visit <a href="http://www.andrewgunther.com">www.andrewgunther.com</a> website, explore links, and consider subscribing to Dr. Gunther's climate science & journalism blog "News + Views." After Dr. Gunther's presentation and our Q&A with him, we will continue our discussion of <u>The Winds of Change</u> . Read the second half of Part One (pp. 41-85) B1-#2 and review your reading notes and questions
5	Feb 11	Part Two "Evidence" in <u>The Winds of Change</u> seminar discussion B1-#3 and announcements of your chosen climate topic and news outlet(s) / read the first half of Part Two (pp. 89-122) B1-#3 and review your reading notes and questions and choose your specific climate topic and news outlet(s)
6	Feb 13	Part Two "Evidence" in <u>The Winds of Change</u> seminar discussion of B1-#4 / read the second half of Part Two (pp. 123-146) B1-#4 and review your reading notes and your questions
7	Feb 25	Part Three "Cross Examination & Redirect" in <u>The Winds of Change</u> seminar discussion B1-#5 / read Part Three (pp. 149-178) B1-#5 and review your reading notes and your questions
8	Feb 27	Part Four "El Nino: The Killer Next Door" in <u>The Winds of Change</u> seminar discussion B1-#6 / read Part Four (pp. 181-216) B1-#6 and review your reading notes and your questions
9	Mar 4	Part Five "The Elephant in the Room" in <u>The Winds of Change</u> B1-#7 / read Part Five (pp. 219-243) B1-#7 and review your reading notes and questions
10	Mar 6	Part Six "Closing Arguments: Are We Next?" in <u>The Winds of Change</u> discussion B1-#8 / read Part Six and the following Afterword and Chronology (pp. 247-304) B1-#8, review your reading notes and questions, finalize the topic of your final class presentation
11	Mar 11	Film Two (F2) "Blue Gold: World Water Wars" watch in class
12	Mar 13	<u>The Three Ages of Water: Prehistoric Past, Imperiled Present, and a Hope for the Future</u> B2-#1 seminar discussion / read the Preface, Introduction, and first half of Part One "Prehistoric Past" (pp. 1-40) B2-#1 and review your reading notes and questions
13	Mar 25	Part One "Prehistoric Past" in <u>The Three Ages of Water</u> seminar discussion B2-#2 / read the second half of Part One (pp. 41-89) B2-#2 and review your reading notes and questions
14	Mar 27	Part Two "Imperiled Present" in <u>The Three Ages of Water</u> seminar discussion B2-#3 / read the first third of Part Two (pp.93-130) B2-#3 and review your reading notes and questions
15	Mar 28	Part Two "Imperiled Present" in <u>The Three Ages of Water</u> seminar discussion B2-#4 / read the second third of Part Two (pp.131-177) B2-#4 and review your reading notes and questions
16	Apr 1	Part Two "Imperiled Present" in <u>The Three Ages of Water</u> seminar discussion B2-#5/ read the third section of Part Two (pp. 178-220) B2-#5 and review your reading notes and questions
17	Apr 3	Part Three "A Hope for the Future" in <u>The Three Ages of Water</u> seminar discussion B2-#6 / read the first half of Part Three (pp. 223-257) B2-#6 and review your reading notes and questions
18	Apr 8	Part Three "A Hope for the Future" in <u>The Three Ages of Water</u> seminar discussion B2-#7 / read the second half of Part Three (pp. 258-300) B2-#7 and review your reading notes and questions
19	Apr 10	Film Three (F3) "Common Ground," a regenerative agriculture documentary film watch in-class followed by discussion of the differences between conventional or industrial agriculture and regenerative agriculture
<b>Apr 11-20</b>		<b>Spring Recess</b>
20	Apr 22	Preface and Chapters 1 & 2 of <u>Dirt: Erosion of Civilizations</u> seminar discussion <b>B3-#1</b> / read the Preface and chapters 1 & 2 (pp. IX-25) <b>B3-#1</b> , review your reading notes and questions
21	Apr 24	Chapters 3 & 4 of <u>Dirt: Erosion of Civilizations</u> seminar discussion <b>B3-#2</b> / read Chapters 3 & 4 (pp.27-81) <b>B3-#2</b> , review your reading notes and questions
22	Apr 29	Chapters 5 & 6 of <u>Dirt: Erosion of Civilizations</u> seminar discussion <b>B3-#3</b> / read Chapter 5 & 6 (pp. 83-144) <b>B3-#3</b> , review your reading notes and questions and begin preparing your final class presentations
23	May 1	Chapters 7 & 8 of <u>Dirt: Erosion of Civilizations</u> class discussion <b>B3-#4</b> / read Chapters 7 & 8 (pp. 145-216) <b>B3-#4</b> , review your reading notes and questions and begin preparing your final class presentations
24	May 6	Chapters 9 & 10 of <u>Dirt: Erosion of Civilizations</u> class discussion <b>B3-#5</b> / read Chapters 7 & 8 of <u>Dirt</u> , review your reading notes and questions / read Chapter 9 & 10 (pp. 217-246) <b>B3-#5</b> and review your reading notes and questions and complete your final class presentation
<b>25</b>	<b>May 8</b>	Student Presentations and Climate Solutions / practice your final class presentation
<b>26</b>	<b>May 13&amp;15</b>	Student Presentations and Climate Solutions; Course Evaluations / practice your final class presentation

**Course Bibliography (Required and Supplementary Readings)**

**Required Reading:**

Linden, Eugene. (2006). The Winds of Change: Climate Weather, and the Destruction of Civilizations, New York, NY: Simon & Schuster Paperbacks, pp. 319.

Gleick, Peter. (2023). The Three Ages of Water: Prehistoric Past, Imperiled Present, and a Hope for the Future, NY: PublicAffairs, Hatchette Book Group, pp. 356.

Montgomery, David R. (2012). Dirt: The Erosion of Civilizations, Berkeley, CA: UC Berkeley Press, pp. 296.

**Supplementary Readings and Viewings to which we collectively we be adding:**

Berry, Wendell. (2017). The World-Ending Fire: The Essential Wendell Berry, Berkeley, CA: Counterpoint Press, pp. 351.

Berry, Wendell. (1977). The Unsettling of America: Culture and Agriculture, Berkeley, CA: Counterpoint Press, pp. 240.

Gates, Bill. (2021). How to Avoid a Climate Disaster: The Solutions We Have and the Breakthroughs We Need, New York, NY: Alfred A. Knopf, pp. 257.

Gleick, Peter, and his co-authors at The Pacific Institute for Studies in Development, Environment, and Security. (1998-2018). The World's Water Volumes 1-9, Washington, DC: Island Press, approximate 400 to 500 pages each volume.

Johnson, Steven. (2006). The Ghost Map: The Story of London's Most Terrifying Epidemic—and How It Changed Science, Cities, and the Modern World, New York, NY: Riverhead Hardcover, pp. 320.

Koonin, Steven E. (2021). Unsettled: What Climate Science Tells Us, What It Doesn't, and Why it Matters, Dallas, TX: BenBella Books, Inc., pp. 306.

Mann, Michael E. (2023). Our Fragile Moment: How Lessons from Earth's Past Can Help Us Survive the Climate Crisis, New York, NY: PublicAffairs, The Hatchette Book Group, pp. 306.

McKibben, Bill. (2010). Eaarth: Making a Life on a Tough New Planet, New York, NY: Times Books, Henry Holt and Company, pp. 253.

Nordhaus, William. (2013). The Climate Casino: Risk, Uncertainty, and Economics for a Warming World, New Haven, CT: Yale University Press, pp. 378.

Schell, Jonathan. (1982). The Fate of the Earth, New York, NY: Alfred A. Knopf, pp. 244.

Tickell, Josh. (2018). Kiss the Ground: How the Food You Eat Can Reverse Climate Change, Heal Your Body & Ultimately Save Our World, New York, NY, Simon and Shuster, Atria/Enliven Books, pp. 352.

Christaki, M., Stournaras, G., Nastos, P.T., Mamassis, N. (2017). Water supply associated with the development of the city of Athens from the Hellenistic era until the end of the 19th century, Dordrecht, Netherlands, Ó Springer Science+Business Media Published online 13 June 2017.

[https://www.iea.org/reports/turning-pledges-into-progress?utm\\_campaign=IEA+newsletters&utm\\_medium=Email&utm\\_source=SendGrid](https://www.iea.org/reports/turning-pledges-into-progress?utm_campaign=IEA+newsletters&utm_medium=Email&utm_source=SendGrid)

**"Turning Pledges into Progress" An accountability framework for reducing emissions from the oil and gas industry**  
**Documentary Films**

"Ice on Fire" about Global Warming, IPCC, Paris Climate Treaty, and the COP Process narrated by Leonardo DiCaprio

"MissionBlue Hope Zones" about Sylvia Earle and Ocean Conservation

"Kiss the Ground" documentary about regenerative agriculture narrated by Woody Harelson

"Common Ground" a sequel to "Kiss the Gound" that begins streaming in September 2024

"Look and See" about Wendell Berry and community assisted agriculture, small family farms as opposed to industrial monocultures

[https://youtu.be/pEt6-jA2UE4?si=rVklXEIZ\\_ruQ27gP](https://youtu.be/pEt6-jA2UE4?si=rVklXEIZ_ruQ27gP) "Climate Change–Averting Castastrophe" glaciers & permafrost, desertification, geoengineering, CCS, Europe, Africa, Indonesia, 1 hr. 25 min.

## **Video or Audible Lectures**

<https://youtu.be/yJQVyC1i4KY?si=kH5iAjpISNBegCcF> Our Fragile Moment, Michael Mann, 55 minutes "Doomism may be the biggest threat to climate action, bigger than denialism."

<https://youtu.be/Wp-WiNXH6hI?si=jQhYzRIfuQhjqSGI> Carl Sagan testifying before Congress in 1985 on climate change, approximately 15 minutes

<https://youtu.be/43DuLcBFxoY?si=oDuf3Fj1Ve68C5z8> "How to protect the oceans," Sylvia Earle, 18 minutes

<https://youtu.be/bINLU-wWQmE?si=6buTBt7DAp-wH979> Mission Blue: Protecting the Blue Heart of the Planet with Sylvia Earle

<https://youtu.be/1MZFrpPPIQ8?si=Ox0xG3bUWoSZvfvk> "The Fight for Water" DW Documentary

<https://youtu.be/xgZC6da4mco> "What the Fossil Fuel Industry Doesn't Want you to Know" a TED Talk by Al Gore

<https://youtu.be/vTp3DQ8h6Ds?si=b7yJwIbvfmvPSKC> "The Game-Changing Promise of Climate TRACE," Al Gore and Gavin McCormick, 57 minutes

<https://youtu.be/QEP3BJxZ8EY?si=aXbWkj5NpuWYCOMM> Will renewables stop the climate crisis? | DW Documentary

<https://youtu.be/zy7vUppYPC8?si=Ifj3FAOzAXUk4t2e>

A few relevant websites

<https://www.AndrewGunther.org> subscribe to this curated New + View Climate Science blog

**<https://us2.campaign-archive.com> Hand-picked climate and sustainability science**

<https://Drawdown.org> and <https://drawdown.org/events>

<https://climaterealityproject.org>

<https://www.hopezones.org>

<https://MissionBlue.org> (Sylvia Earle)

<https://southernenvironment.org> Southern Environmental Law Center