

ENVR 374 | Planetary Ecology: Climate Science & Climate Solutions Fall 2026

Course Instructor: Dr. Franklin Bailey Green
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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, survival, and flourishing 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 increasingly severe and more frequent extreme weather events. As we observe the impacts and risks of climate change, we will also explore climate solutions both from a global environmental or “planetary” perspective and from an individual, societal, and local 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 potentially reverse global warming.

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

In our twice weekly seminars, students will have an opportunity to discuss our reading assignments, documentary films, guest lectures, climate journalism and to take turns leading class discussions. Students will submit short, 500- to 1,000-word weekly reflections at the end of each week. As a final exam, each student will present a 12- to 15-minute powerpoint lecture on a climate topic that they have been following throughout the semester. Each of these assignments will contribute to our achievement of the following learning objectives and 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 and atmospheric concentrations, heat transfer, thermohaline circulation (THC), atmospheric rivers, and atmospheric and oceanic circulations;
- Identify the interconnections among climate, weather, intact nature, water, energy, food, health, security, and human migration;
- Understand the interconnections, risks, feedback loops, and mutually reinforcing solutions among nine planetary systems including: climate, land (terrestrial biomes), biodiversity, freshwater, nitrogen and phosphorus nutrient cycles, oceans & habitats (acidification), novel entities (aerosol particulates, radioactive wastes, etc.), and the ozone layer; and,

- Understand and appreciate the importance of the freshwater cycle, saline and freshwater stocks and flows, rainfall intensity and duration, runoff, geomorphology, aquifers, 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, carbon sequestration, climate impacts, environmental health, human health, and global health;
- Compare and contrast linear and circular economies, as well as hard and soft energy and water paths;
- Investigate, evaluate, and consider climate practices and solutions that reduce, eliminate, and draw down atmospheric concentrations of 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, 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 and/or future studies.

Course Requirements

Students will be required to read, or listen to, carefully and critically three books and multiple journal articles. Students will also be required to watch and study at least three 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. Students may be asked to present a short synopsis of the key concepts and connections presented in the required readings and documentary films.

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

Weekly Written Reflections 40% -- 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 written in MS Word to an email addressed to me at: 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 while writing your weekly reflections. Students will be encouraged to follow a specific climate-related topic about which they are interested and intrigued using multiple news outlets and peer reviewed journal articles. Students' individual climate journalism topics must be proposed to, discussed with, and approved by the Professor. These individual research topics will be presented during our final class or, if permitted, during our final exam period as a final exam equivalent.

Class Contributions 20% -- 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 Presentations 40% -- At the end of the semester, each student will make a 12- to 15-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 use a powerpoint presentation, handouts, and other enhancements to present and teach your selected planetary boundary, climate impact and climate solutions topic.

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 unexcused absences will be recorded, and they may affect one's grade. Illness or other such compelling reasons which result in absences should be reported immediately to the Student Affairs Office, via the form available in the Student Portal. If you are unable to come to class for any reason, please let me know beforehand, if at all 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, write, 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 taking notes. 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, pp. 285.

Fall 2026 Schedule

Class #	Date/Day	Topic / Assignments Due
1	Sept. 8	Welcome, brief introductory remarks; view Film One (F1) <i>Breaking Boundaries: The Science of Our Planet</i> paying attention to the nine interconnected planetary systems each in their various stages of safety, caution, danger, observed consequences, and several available solutions; we are in this climate science, climate solutions, environmental justice seminar together
2	Sept. 10	Introductions, Expectations, Climate Interests, Academic Major(s) & Minors; Course Overview, Learning Objectives, Expectations, and Assignments including required readings, documentary films, climate

Class #	Date/Day	Topic / Assignments Due
		journalism & peer-reviewed literature, weekly written reflections, mid-term exam, final exam/independent research project; Begin seminar discussion of <i>Breaking Boundaries</i> and Johan Rockstrom's framework of nine interconnected planetary systems / re-watch F1 (available on Netflix) and write your first weekly reflection by Sunday February 1st at 5 PM
3 & 4	Sept. 15	"Opening Arguments" in <u>The Winds of Change: Climate, Weather, and the Destruction of Civilizations</u> discussion / read and prepare to discuss the Preface & first half of Part One (pp. 1-40); decide about upgrading to a 400-level course Class No. 4 Guest Speaker Dr. Andrew Gunther, via Zoom 8 PM to 9:35 PM / visit www.andrewgunther.com read, explore links, consider subscribing to this climate science journalism blog "News + Views." After Dr. Gunther's lecture, engage by asking questions and offering comments when appropriate.
5	Sept. 22	Second half of "Opening Arguments" in <u>The Winds of Change</u> / read the second half of Part One (pp. 41-85) and review your reading notes and questions
6	Sept. 24	Part Two "Evidence" in <u>The Winds of Change</u> seminar discussion and announcements of your chosen climate topic and news outlet(s) / read the first half of Part Two (pp. 89-122) and review your reading notes and questions and choose your specific climate topic and news outlet(s)
7	Sept. 25	Part Two "Evidence" in <u>The Winds of Change</u> discussion / read second half of Part Two (pp. 123-146) and review your notes and questions
8	Sept. 29	Part Three "Cross Examination & Redirect" in <u>The Winds of Change</u> discussion / read Part Three (pp. 149-178) & review your notes and questions
9	Oct. 1	Part Four "El Nino: The Killer Next Door" in <u>The Winds of Change</u> seminar discussion / read Part Four (pp. 181-216) & review your notes and questions
10	Oct. 6	Part Five "The Elephant in the Room" in <u>The Winds of Change</u> / read Part Five (pp. 219-243) and review your notes and questions
11	Oct. 7	Part Six "Closing Arguments: Are We Next?" in <u>The Winds of Change</u> discussion / read Part Six, Afterword, Chronology, Acknowledgements (pp. 247-306) & review your notes and questions; finalize the topic of your research presentation
12	Oct. 13	View Film Two (F2) <i>Blue Gold: World Water Wars</i> watch in class / <u>The Three Ages of Water: Prehistoric Past, Imperiled Present, and a Hope for the Future</u> read the Preface, Introduction, and first half of Part One (pp. ix-40) and review your notes and questions
13	Oct. 15	Second half of the "Prehistoric Past" in <u>The Three Ages of Water</u> discussion / read the second half of Part One (pp. 41-89) & review your notes and questions
14	Oct. 20	Part Two "Imperiled Present" in <u>The Three Ages of Water</u> seminar discussion B2-#3 / read first third of Part Two (pp.93-130) & review your notes and questions
15	Oct. 22	Part Two "Imperiled Present" in <u>The Three Ages of Water</u> seminar discussion / read second third of Part Two (pp.131-177) & review your notes and questions
16	Nov. 3	Part Two "Imperiled Present" in <u>The Three Ages of Water</u> seminar discussion / read third section of Part Two (pp. 178-220) & review your notes and questions
17	Nov. 5	Part Three "A Hope for the Future" in <u>The Three Ages of Water</u> discussion / read first half of Part Three (pp. 223-257) & review your notes and questions
18	Nov. 10	Part Three "A Hope for the Future" in <u>The Three Ages of Water</u> discussion / read second half of Part Three (pp. 258-304) & review your notes and questions
19	Nov. 17	View Film Three (F3) <i>Common Ground</i> , a regenerative agriculture documentary film and discuss the differences between conventional "industrial" agriculture and "regenerative" agriculture
20	Nov. 19	<u>Dirt: Erosion of Civilizations</u> discussion / read Preface and Chapters 1-4 (pp. IX-81) over Spring Recess, review your notes and questions
21	Nov. 24	Chapters 5 & 6 of <u>Dirt: Erosion of Civilizations</u> seminar discussion / read Chapters 5 & 6 (pp. 83-144) review your notes and questions; continue finalizing your independent research presentations
22	Dec. 1	Chapters 7 & 8 of <u>Dirt: Erosion of Civilizations</u> class discussion / read Chapters 7 & 8 (pp. 145-216) review your reading notes and questions; continue finalizing your independent research presentations
23	Dec. 3	Chapters 9 & 10 of <u>Dirt: Erosion of Civilizations</u> discussion / read Chapter 9 & 10 (pp. 217-246) and review your notes and questions and complete your final class presentation
	Dec. 8	No Class (due to two classes on Sept. 15)
24	Dec. 10	Student Presentations by Zoom 3:30-5:05 PM
	Dec.14-17	Final Exams

Recommended Additional Bibliography, Documentary Films, Lectures, and Organizations

- Amrith, Sunil. (2024). The Burning Earth: An Environmental History of the Last 500 Years, UK: Allen Lane (part of Penguin Random House), pp. 418.
- Berger, John J. (2023). Solving the Climate Crisis: Frontline Reports from the Race to Save the Earth, New York: Seven Stories Press, pp. 509.
- 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.
- 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.
- 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.
- Gleck, Peter, and 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, between 400 and 500 pages per volume.
- Gore, Albert. (2013). The Future: Six Drivers of Global Change, New York: Random House, pp. 558.
- Hayhoe, Katherine. (2021). Saving Us: A Climate Scientist's Case for Hope and Healing in a Divided World, New York: One Signal Publishers, pp. 307.
- Jacobson, Mark Z. (2023). No Miracles Needed: How Today's Technology Can Save Our Climate and Clean Our Air, Cambridge, UK: Cambridge University Press, pp. 437.
- Johnson, Ayana Elizabeth. (2024). What If We Get It Right?: Visions of Climate Futures, New York: One World, pp. 469.
- Johnson, Ayana Elizabeth & Wilkinson, Katharine K., eds. (2020). All We Can Save: Truth, Courage, and Solutions for the Climate Crisis, New York: One World, pp. 420.
- 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.
- Kimmerer, Robin Wall. (2013). Braiding Sweetgrass: Indigenous Wisdom, Scientific Knowledge, and the Teaching of Plants, Minneapolis, MN, pp. 390.
- Koomey, Jonathan. (2012). Cold Cash, Cool Climate: Science Based Advice for Ecological Entrepreneurs, Burlingame, CA: Analytics Press, pp. 197.
- 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.
- Linden, Eugene. (2022). Fire and Flood: A People's History of Climate Change, from 1979 to the Present, New York: Penguin Press, pp. 291.
- 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 Hachette 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.
- Monbiot, George. (2023). Regenesiis: Feeding the World Without Devouring the Planet, UK: Penguin Random House, pp. 339.
- 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.
- Sedlak, David. (2023). Water for All. Global Solutions for a Changing Climate, New Haven, CT: Yale University Press, pp. 426.
- Siegel, Seth M. (2019). Troubled Water: What's Wrong with What We Drink, New York: Thomas Dunne Books, pp. 330.
- Simard, Suzanne. (2021). Finding the Mother Tree: Discovering the Wisdom of the Forest, New York: Vintage Books, pp. 345.
- Steyer, Tom. (2024). Cheaper, Faster, Better: How We'll Win the Climate War, New York: Spiegel & Grau, pp. 242.
- 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.
- Wallace-Wells, David. (2019, 2020). The Uninhabitable Earth: Life After Warming, New York: Tim Duggan Books, pp. 361.
- Yergin, Daniel. (2020, 2021). The New Map: Energy, Climate, and the Clash of Nations, New York: Penguin Press, pp. 524.

Documentary Films

- "Ice on Fire" about Global Warming, IPCC, Paris Climate Treaty, and the COP Process narrated by Leonardo DiCaprio.
- "Mission Blue Hope Zones" about Sylvia Earle and Ocean Conservation.
- "Kiss the Ground" documentary about regenerative agriculture narrated in part by Woody Harelson.
- "Common Ground" a sequel to "Kiss the Gound" that began streaming September 2024.
- "Look and See" about Wendell Berry and the birth of Community Assisted Agriculture, comparing small family farms with industrial monoculture farms.
- https://youtu.be/pEt6-jA2UE4?si=rVklXEIZ_ruQ27gP "Climate Change–Averting Catastrophe" glaciers & permafrost, desertification, geoengineering, CCS, Europe, Africa, Indonesia, 1 hr. 25 min.

Video or Audible Lectures

<https://youtu.be/yJOVyC1i4KY?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/1MZFrJPPIQ8?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> (consider subscribing to Dr. Gunther's curated *News + Views* Climate Science blog)

<https://climateralityproject.org>

<https://Drawdown.org>

<http://www.edf.org>

<https://www.hopezones.org>

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

[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

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

<http://www.nrdc.org> (Natural Resources Defense Council)

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