

University of Colorado Denver  
College of Liberal Arts and Sciences  
**ENVS/GEOG 4720/5720: Climate Change – Causes, Impacts & Solutions**

**Class location:** Remote; via Zoom

**Class time:** Mon & Wed 12:30pm – 1:45pm

**Instructor:** Dr. Kathy Kelsey

**Contact:** email in Canvas

**Office Hours:** Mon 2-3:00pm; Wed 2-3:00pm or by appointment; conducted via Zoom.

**Zoom link:** (for Office Hours but not class): <https://ucdenver.zoom.us/my/kkelsey>

**Catalog Description:** Examines the science behind past, present and future climate change, and environmental, social and political implications and solutions. Explores recent scientific research, syntheses, and mainstream literature advancing knowledge about causes and consequences of natural and anthropogenic climate change. Prereq: GEOG 3232 (Weather and Climate). Cross-listed with GEOG 572/ENVS 4720/ENVS 5720. Max hours: 3 Credits.

**Course Overview:** In this course we will investigate the science behind the causes of climate change, use literature from scientific studies to understand and explore the ongoing and anticipated impacts of climate change, and engage in practical and informed discussions of the solutions to climate change. We will use a student-centered learning approach including active learning, student-led discussions and group work. The course is designed this way (1) to improve learning, as research shows student-centered approaches improve learning success; and (2) to allow you to gain professional skills your future employers will value: critical thinking, professional communication via writing and presentation, organization and effectiveness working with collaborators.

**Course Goals (What you will gain knowledge of):**

1. The physical scientific basis of the *causes* of anthropogenic climate change;
2. The scientific and social basis behind the *impacts* of climate change, and how scientists study the impacts of climate change;
3. The science and ethics of proposed and on-going *solutions* to climate change.

**Course Objectives (What you will be able to):**

1. Explain and defend the lines of reasoning that support human-caused climate change;
2. Formulate a thoughtful opinion or response to climate related news or policy grounded in understanding of current climate science;
3. Synthesize the most “serious” effects of climate change;
4. Explain and defend your own opinions on viable climate change solutions;
5. Distinguish between climate change mitigation versus adaptation;
6. Locate, interpret, and communicate credible information on climate related topics;
7. Collaborate in small groups and constructively evaluate peer work.

**Required Texts and Materials:**

Mann, Michael & Kump, Lee. *Dire Predictions: Visual Guide to the Findings of the IPCC*. (2nd edition). DK (Publisher). ISBN-10: 1465433643.

Hawken, Paul (Ed.). *Drawdown: the most comprehensive plan ever proposed to reverse global warming*. Penguin Books. ISBN 978-0-14-313044-4

Ruddiman, William *Plows, Plagues and Petroleum*. Princeton University Press. ISBN 978-0-691-13398-0; (\*\*for graduate students only)

**Additional Materials and Equipment:** Our class is Remote this semester, due to limited courses on campus in response to COVID-19. To attend class, you will need access to an electronic device, preferably a computer, with a camera, microphone, and access to the internet. Internet access will also be required to receive communications from me and obtain additional reading material posted on Canvas. If you anticipate an issue with having a computer or reliable internet access, please be in touch with me and I can help connect you with additional resources.

**Assessment and Grading:**

Assignment	Undergrad; GEOG 4720	Grad; ENVS 5720
In-class assignments	10%	5%
Reading summary & Muddiest point	10%	5%
Reflective Essay	5%	5%
Special topics presentation	25% Proposal: 5% Class session: 20%	25% Grad discussion: 10% Classroom session: 15%
Independent Research Project	50% Proposal: 5% Draft & peer review: 10% Paper: 25% Presentation: 10%	50% Proposal: 5% Draft & peer review: 10% Paper: 25% Presentation: 10%
Grad phenology project	--	10%

- 1. Attendance and in-class Assignments:** This is a student-centered course which means that we will do a lot of important work in-class to facilitate your learning. One quarter (25%) of your grade will be based on the work that you complete in class, sometimes on your own and sometimes as part of a group. To complete this work and receive credit, it is critical that you attend class. You will not be able to make up in-class assignments unless you have made a prior arrangement with me, or in exceptional circumstances. If you have a legitimate reason why you will be late, leave early, or cannot attend, you must let me know in advance. If you are too sick to attend class, please let me know as soon as possible, preferably before class.
- 2. Reading Summary and Muddiest Point:** Before each class you are responsible for reading the material assigned for that day, and posting your response on Canvas. Your response will be a 150-word summary of the reading material, and the “Muddiest point:” one to two questions or points of confusion from the reading. More information is available on Canvas. You will have the opportunity to drop your lowest ‘Reading Summary and Muddiest Point score’. It is my goal to read your responses before class.
- 3. Special topics (in groups):** Student groups will lead one class period on a “special” topic of the group’s choosing. Topics must be scientific in nature, and be related to *impacts of* or *solutions to* climate change. For these classes, each student group will be responsible for leading one class session. The group will identify 1-2 peer reviewed scientific articles to assign for pre-class reading, start the class session with a mini-lecture review of the article, respond to students “Muddiest point” questions, and then lead a discussion of the papers or an active learning activity on the topic. Each group must discuss their topic with me, and turn in a synopsis **Friday, Sept 18**. A rubric for these classes will be posted on Canvas.

**Graduate Students:** The “Special Topics” assignment for Graduate Students will be focused on the reading of *Plows, Plagues and Petroleum* by William Ruddiman. Graduate students will host an independent discussion section with Dr. Kelsey during the semester, and teach one class period (as a group) for the rest of the class on the hypothesis presented in this book.

4. **Reflective Essay:** During the first week of the semester, you will have the opportunity to reflect on your current thoughts, concerns and knowledge about the causes, impacts and solutions to climate change and related issues. You will turn in these reflections as an essay on Canvas. During the last week of the semester I will refer you back to these thoughts, and you will use them to reflect on how your knowledge and understanding of climate change has evolved over the course of the semester. The final reflection is a 2-page essay due on Canvas at the end of our finals period (exact date and time to be determined).
5. **Individual Research Project:** The purpose of this research assignment is for each student to gain expert-knowledge about a cutting-edge or controversial topic in the discussion of climate change. You will develop and argue an informed scientific position (not a personal opinion) about this topic, and communicate your argument in a research paper and an in-class presentation at the end of the semester.
  - a. **Proposal:** A 1-page proposal of your topic, including a summary of 3 relevant references you have read thoroughly, is due on Canvas **Friday, Sept 18**.
  - b. **Rough draft for peer-review** Each student will conduct a peer-review of two other research papers, based on a rubric I provide, see Canvas. Your draft is due for peer review on **Friday, Oct 30** and the reviews are due on **Friday, Nov 6**. I will also grade and provide feedback on your drafts.
  - c. **Paper:** You will develop your argument in 2500-3000 words using ~15 references for undergraduate students or within 3500-4000 words using ~20 references for graduate students. Papers are due **Sunday, December 6**. More information and a rubric for papers will be posted on Canvas.
  - d. **Response to reviews:** Each author will respond to the reviews in a written Response describing how comments were incorporated the comments or defending a decision not to incorporate specific comments. Response will be turned in with the final paper, and papers will be graded in part by how the author addresses peer-comments.
  - e. **Presentation:** Student presentations will take place during the last three weeks of the semester and will be ~12 minutes, followed by ~3 minutes for questions and discussion. Each student is expected to make a thoughtful comment or ask a question of at least three peer presentations. You will record your questions/comments and turn them in on Canvas. More information will be available on Canvas.
6. **Graduate students: Plant Phenology Observation Project:** Plant phenology (the study of seasonal changes in organisms, such as when plants lose their leaves in fall) is an important field of study used by scientists to study the effects of climate change. Graduate students will be responsible for establishing a phenology observation site, observing plant phenology 2-3 times per week during the semester, and recording these observations digitally with the National Phenology Network. At the end of the semester, students will produce a written document describing their site and findings and comparing their findings to another location or through time using historical data. More information will be available on Canvas. Phenology projects will be due at the end of the Finals period for this course.

## Course Schedule and Assignment Due Dates

Please complete any assignment listed under “Reading” before coming to class. Your Reading Summary and Muddiest Points are due on Canvas the day of class at 11am.

Abbreviations: DP = *Dire Predictions*; DD = *Drawdown*

Wk	Day	Date	Topic	Reading	Assignments due
1	M	17-Aug	Introduction		
1	W	19-Aug	Group Meetings with Dr. Kelsey	Get to Know You; Pre-course Reflection	
1	F	21-Aug	<b>PRE-COURSE REFLECTION due to Canvas by 11:59pm</b>		
2	M	24-Aug	Climate Change Basics	DP: Intro, pg 6-49	Summary/Muddiest Pt
2	W	26-Aug	Climate Change Basics	DP: pg 50-81	Summary/Muddiest Pt
3	M	31-Aug	Climate Change Basics	Canvas	
3	W	2-Sep	Solutions – Energy	DD: pg 2-36	Summary/Muddiest Pt
4	M	7-Sep	<i>Labor Day</i>		
4	W	9-Sep	Solutions – Food	DD: pg 37-73	Summary/Muddiest Pt
5	M	14-Sep	Climate Change Projections	DP: pg 82 - 117	Summary/Muddiest Pt
5	W	16-Sep	CO <sub>2</sub> modeling exercise	Modeling exercise due end of class	
5	F	18-Sep	<b>PROJECT PROPOSALS due to Canvas 9/18 by 11:59pm</b>		
5	F	18-Sep	<b>SPECIAL TOPICS CLASS SYNOPSIS due to Canvas 11:59pm</b>		
6	M	21-Sep	Solutions – Landuse, Carbon Management	DD: pg 108-134, Hurteau	Summary/Muddiest Pt
6	W	23-Sep	Carbon Management	Case study due end of class	
7	M	28-Sep	The Impacts of Climate Change	DP: pg 120-149	Summary/Muddiest Pt
7	W	30-Sep	Vulnerability and Adaptation	DP: pg 152 -163	Summary/Muddiest Pt
8	M	5-Oct	Solving Climate Change	DP: pg 164-213	Summary/Muddiest Pt
8	W	7-Oct	Solutions – Women & Girls, Buildings & Cities, Transport & Materials	DD: pg 76-106; 135 - 170	Summary/Muddiest Pt
9	M	12-Oct	Solutions – Coming Attractions	DD: pg 172-212	Summary/Muddiest Pt
9	W	14-Oct	Special topics	Canvas	Summary/Muddiest Pt
10	M	19-Oct	Special topics	Canvas	Summary/Muddiest Pt
10	W	21-Oct	Special topics	Canvas	Summary/Muddiest Pt
11	M	26-Oct	Special topics	Canvas	Summary/Muddiest Pt
11	W	28-Oct	Independent research project Work Day	Work on independent projects	
11	F	30-Oct	<b>RESEARCH PAPER DRAFTS due to Canvas for peer review by 11:59pm</b>		
12	M	2-Nov	Peer review work day	Work on peer reviews	
12	W	4-Nov	Special topics	Canvas	Summary/Muddiest Pt
12	F	6-Nov	<b>PEER REVIEWS due 11/6 BY 11:59PM</b>		
13	M	9-Nov	Special topics	Canvas	Summary/Muddiest Pt
13	W	11-Nov	Final Presentations	--	
14	M	16-Nov	Final Presentations	--	
14	W	18-Nov	Final Presentations	--	
15	23-27 Nov		<i>Fall Break – no class</i>		
16	M	30-Nov	Final Presentations	--	
16	W	2-Dec	Final Presentations	--	
16	Sun	6-Dec	<b>RESEARCH PAPERS due to Canvas Sunday 12/6 by 11:59pm</b>		

## **Course and Classroom Policies**

**What Does It Mean That Our Course Is Remote?** Due to COVID-19 we will not have any in-person meetings on campus this semester. You are required to be present on Zoom for classes at our regularly scheduled time each week (Monday and Wednesday; 12:30 to 1:45pm Mountain Time). Please come prepared to participate on Zoom for the entire duration of our class. The Zoom link for our class will be provided via Canvas. For office hours and individual meetings, please use my personal zoom channel (see link above). For technical support with Zoom, please contact the CU Online help desk at 303.315.3700 or email [cuonlinehelp@ucdenver.edu](mailto:cuonlinehelp@ucdenver.edu)

**In-class Expectations:** Because this is a student-centered course, I expect you to please arrive to class on-time, and stay for the entire period. Prepare to actively participate by reading the assigned material carefully before class. As we will be meeting via Zoom, I would appreciate it if your *video remains on during class* to facilitate interaction and engagement with each other as well as the course material. If this poses a problem for you, please let me know as soon as possible. I will frequently place you into ‘break out rooms’ so that you can engage in discussions with a smaller group of students. Additionally, you will be using Zoom to meet with peers outside of class, lead class discussion on “Special topics” and to present your Independent Project presentations (instructions will be provided).

**Zoom Class Recording:** In some cases, I will record a portion of our Zoom class session as an additional resource for students. I will make an effort to record only myself (the instructor) speaking, I will not record class discussion, and I will always announce when I am recording. Class recordings will be available to students on Canvas for some period of time. The objective of recording these sessions is to help support students who may be required to miss class due to unforeseen circumstances. Please contact me if you have questions or concerns about this policy.

### **Grading scale:**

A: 94-100% A-: 90-93%

B+: 87-89% B: 84-86% B-: 80-83%

C+: 77-79% C: 74-76% C-: 70-73%

D+: 67-69% D: 64-66% D-: 60-63%

F: 0 - 59%

**Late Assignments:** Late assignments will not be accepted, except in rare circumstances, in which case you should send me an email via Canvas as soon as possible to discuss the situation.

**Civility:** We will discuss some controversial topics in this class, and I am committed to developing and actively protecting an environment in which every individual feels comfortable and respected, and can have their voice heard. It is appropriate to express an opposing view, but please do so with civility. Failure to meet these standards will result in removal from the class. If you have questions or concerns, please let me know.

**Communications:** I will commonly need to contact you between classes, and I will do so using the email function in Canvas. Please check your email regularly. If you are not receiving emails, or having another issue with Canvas, please let me know. The best way to get your questions for me answered is to come to my office hours. I will also make every effort to answer your inquiries sent through Canvas within two days. If you do not get a response from me within this time, feel free to send a polite follow-up email.

**Academic Honesty, Cheating and Conduct:** You must complete your work on your own, or with your group in the case of group work, without outside help. Any infractions may result in failure on an assignment or in the class, and/or dismissal from the University. In addition, you must adhere to campus policies in the University of Colorado Denver Student Code of Conduct, which can be downloaded at:

<http://www.ucdenver.edu/life/services/standards/Documents/CUDenver-CodeofConduct.pdf>

**Plagiarism:** Plagiarism is defined herein as presenting the work of another as your own without proper acknowledgement. The following is considered plagiarism by CU Denver: word-for-word copying of another person's ideas or words (e.g., four consecutive words or more); copying the mosaic of another person's work (e.g., the interspersing of one's own words here and there, while in essence, copying another's work); paraphrasing (e.g., the rewriting of another's work, yet still using their fundamental idea or theory); fabricating or inventing counterfeiting sources; submitting another's work as one's own (e.g., including materials obtained from friends or purchased from the Internet); and neglecting quotation marks on material that is otherwise acknowledged, or overusing quotations. *In this course, use quotations only in very rare situations.* If you like the way an author states something, you must shape and synthesize their verbiage into your own thoughts and words. This is your one and only warning: I will not tolerate plagiarism and have tools in place to catch plagiarizers. Plagiarism will lead to failure on an assignment and/or in the class, and will be reported to the CLAS administration who may decide to hand down more stringent penalties. If you are not sure what plagiarism is or how to avoid it, please visit the University of Colorado Denver Writing Center.

**Access, Disability, Communication:** The University of Colorado Denver is committed to providing reasonable accommodation and access to programs and services to persons with disabilities. Students with disabilities who want academic accommodations must register with Disability Resources and Services (DRS), 177 Arts Building, 303-556-3450, TTY 303-556-4766, FAX 303-556-2074. I will be happy to provide all approved accommodations, once you provide me with a copy of the DRS letter, an electronic copy is fine.

**Preferred Names and/or Pronouns:** I will gladly honor your request to address you by an alternate name or gender pronoun. Please advise me of this preference early in the semester so that I may make appropriate changes to my records.

**Other Items:** This syllabus cannot cover all conceivable events or complications that could occur over the course of the semester. In addition to the policies outlined herein, students are expected to adhere to all University policies and state/federal laws and regulations. In the event that there is no guidance offered in this syllabus for an event or issue that arises in your life, please feel free to contact me and together we will seek a reasonable resolution. These activities may involve consultation with department and University administrators. Additional University policies are attached to this syllabus.

**Additional Resources:** [https://clas.ucdenver.edu/faculty-staff/sites/default/files/attached-files/student\\_services\\_and\\_calendar.pdf](https://clas.ucdenver.edu/faculty-staff/sites/default/files/attached-files/student_services_and_calendar.pdf)