EVSC 1559 Spring 2014—An inconvenient truce: climate, you and CO2
Syllabus

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Class website: https://collab.itc.virginia.edu/portal/site/928f4df4-edf8-45bb-a001-58e3dbf23e53
Class: TTh 12:30-1:45 in Nau 101

Course Description
Is global warming real? Do you wish you understood more so you didn't have to wonder? Climate is not as complicated as it seems. In this class, you will learn how the climate system works, how climate has changed in the past, and how it is likely to change in the future. Perhaps you hope to work, one day, for a company with global reach, with lots of projects or tons of money to invest. Business depends on ports, railroads, bridges and roads functioning as they always have—but will they? You may ultimately live near the coast, along with half of all humanity. Will your town be flooded by sea-level rise?

You will explore the consequences of a changing climate for humanity and the earth system on which we all depend. You will also discuss what we can do about it. During the course, you will engage in discussions of climate occurring in the public sphere in real-time—responding with science to images, articles, blogs, and films that you encounter. Lectures will be combined with interactive activities inside and outside of the classroom. Peer dialogue is a critical component of the course, and I will provide many opportunities for you to interact with each other around the ideas we explore. We will practice formulating scientific arguments and communicating them effectively to others.

When you leave this class, and reflect on it years from now, my goals are for you to be able to

- explain how the climate system works
- describe how it is likely to change in the future
- outline the consequences for humanity and the ecosystems on which we depend
- formulate and critique options for influencing the climate in your lifetime

As you go on to live your life, I hope you will feel comfortable engaging in debates on public policy surrounding what many consider the defining issue of our time. Finally, I hope the course will help you communicate better, and that you will share your understanding of climate change with the people in your life.

Learning Objectives
By the end of the course, you will be able to

- identify the key elements of the climate system and the major drivers of change

- examine climate models to reveal critical processes and feedbacks and to predict the consequences of climate change
- evaluate current messages about climate change in the public sphere
- communicate and share your scientific knowledge of climate, engage in debates on climate policy, and add a new dimension to your personal experience.

Learning Assessments
For more detail, see 'Guide to grading' and 'Assignment schedule' in resources folder on the collab site.

Timing	Type of assessment		Evaluation	Grading
Every class	Warm-ups before class		10%	Completion[1]
Every class	Exercises/questions in class		12%	Completion[2]
	Exams		49%	Graded
Week 5	Exam 1	(16%)		
Week 8	Exam 2	(17%)		
Week 13	Exam 3	(16%)		
Week 11-16	Blogging and commenting		19%	Graded
Week 11-16	Blog reading		10%	Completion

I will provide a rubric for graded assignments, indicating how the assignment will be evaluated along with directions for completion. Further details will be provided in separate documents posted to the collab site. I will also review the assignments in class.

Learning materials
The required textbook is Andrew Dessler's Introduction to Modern Climate Change (ISBN 9780521173155) You may consider purchasing the electronic version of this book if it is availabel. Additional required readings are posted on the collab site under 'resources'.

In addition, you and your classmates will post to our class blog (the 'forum'), with links to current stories, articles, or other items of interest you come across on the web. These will enrich your view of how climate is perceived in society and how that does or does not relate to the climate science you are exploring. Think of your classmates as a resource, along with the grader and myself.

We will use learning catalytics for in-class exercises. It is a program that allows you to use any mobile device (smart phone, tablet, laptop) to participate during in-class activities. You will

[1] For full credit on class preparation, you must answer 50% of all questions correctly over the course of the entire semester (not for one chapter or assignment); 40-49% correct will result in being awarded 85% of the total points. Fewer correct answers will be awarded points on a linear scale with 50% of the total credit still being awarded for 10% correct answers. This is an easy way to get points, so do these assignments!

[2] For full credit on in-class participation, you must answer 90% of all questions over the course of the entire semester. **You do not have to answer them correctly, you simply ANSWER as best you can**. Answering 80% of all questions will result in 90% credit, 70% in 80% credit, 60% in 70% credit, etc.

need one of these devices. If you do not have one, please come see me. Please go to learningcatalytics.com to sign up. You will need a credit card and an email address.

Course Schedule
See next page.

Class Policies
Respect While the basic science of climate change is not controversial, what we should do about it **is**. As such, we all need to be very conscientious of our demeanor in the classroom and on the course blog. This is an important conversation we are having—let's be respectful.

eDevices You will use your smart phones, tablets, or laptops to participate during class but I ask that you use them *for class-related activities only*. If using these devices ends up distracting the class, we will have to leave them outside the classroom (and go back to cave-man tactics like colored index cards!). To avoid distracting those behind you, if you take notes on your laptop please sit in the back of the classroom.

Late work All assignments will be turned in on the collab site and will be time limited, so late work is not permitted.

Make-up exams are possible only for official university-related activities. Please discuss with me well in advance.

Email I will try to check my class email at least once a day before I go home. I will not necessarily respond to your email, as a large class can quickly become overwhelming. I prefer to discuss things with you directly and ask you to email me with a problem and then find me after class to talk. You can also come to my office hours.

Supplemental readings
The full report from the IPCC on the physical basis of climate change
http://www.climatechange2013.org/images/uploads/WGIAR5_WGI-12Doc2b_FinalDraft_All.pdf

The summary for policy makers (shorter and far more manageable):
http://www.climatechange2013.org/images/uploads/WGI_AR5_SPM_brochure.pdf

Advancing the Science of Climate Change from the National Academy of Sciences
http://www.nap.edu/catalog.php?record_id=12782 (you can download it for free as an educational resource)

Course Schedule

month	date	topic	reading		assignment
January	14	intro to the class & climate change			
	16	intro to the climate problem	ch 1		answer Qs
	21	is the climate changing?	ch 2		answer Qs
	23	is the climate changing?			ask Qs (lecture/reading)
	28	radiation and energy balance	ch 3		answer Qs
	30	radiation and energy balance			ask Qs (lecture/reading)
Feb	4	a simple climate model	ch 4		answer Qs
	6	a simple climate model			ask Qs (lecture/reading)
	11	first exam			
	13	snow day	ch 5		answer Qs
	18	carbon cycle	ch 5		ask Qs (lecture/reading)
	20	carbon cycle			ask Qs (lecture/reading)
	25	radiative forcing	ch 6		answer Qs
	27	forcings and feedbacks			ask Qs (lecture/reading)
March	4	climate sensitivity	ch 6		ask Qs (lecture/reading)
	6	why is the climate changing	ch 7		answer Qs
	11	spring break			
	13	spring break			
	18	future of our climate	ch 8		answer Qs
	20	second exam			
	25	impacts of climate change*	ch 9		answer Qs
	26				sea level rise blog posts due
	27	sea level rise	collab		ask Qs (lecture/reading/blog)
	28			**	comments on sea level rise blogs due
	31				water blog posts due
April	1	water, fresh and salty	collab		ask Qs (lecture/reading/blog)
	2				comments on water blogs due
	2				ecosystems blog posts due
	3	ecosystems, natural and not	collab		ask Qs (lecture/reading/blog)
	4				comments on ecosystems blogs due
	7				human health/infrastructure posts due

8	human health and infrastructure	collab	ask Qs (lecture/reading/blog)
9			comments on human health/infra blog
10	third exam		
15	economics for climate change***	ch 10 + collab	answer Qs
16			climate economics blog posts due
17		****	comments on economics blogs due
17	climate policy	ch 11	answer Qs
18			climate policy blog posts due
21			comments on policy blogs due
22	mitigation	ch 12	answer Qs
23			mitigation blog posts due
24			comments on mitigation blogs due
24	climate politics	ch 13	answer Qs
25			climate politics blog posts due
28			comments on politics blogs due
29	in it for the long haul	ch 14	ask Qs (lecture/reading/blogs)

Instructions for how to do well on the assignments

(note: the sections and numbers below correspond to the ones on the 'Guide to Grading')

Preparation for class (10% of your grade)

Warm-ups before class

For the most part, I will alternate between a) asking questions that you answer after doing the reading and b) soliciting your questions based on the last lecture, the reading, or a blog post. The deadline is 9 am on the day of class, every day we meet. The deadlines for warm-ups are firm, set so that I can review the class responses before I teach a few hours later in the day and adjust the lecture as needed.

1. Questions from me about the reading

You will find these questions under the 'quizzes' tool on collab. They will be multiple choice. After you have read the assigned chapter, simply answer the questions for that chapter in advance of the deadline. These questions are open-book, and you can take as long as you want to figure out the answers, but I would prefer that you work on them independently. Group work will be done in class. As noted in the guide to grading, you will get full credit if you get half the questions right over the course of the semester, so don't worry if you bomb on the questions for one particular chapter.

2. Asking a question of me

These questions will be submitted under the 'assignments' tool on collab. I am open to all kinds of questions—asking about something we did in lecture earlier in the week, or following up on something from the reading, or pursuing a thought related to one of the posts by your classmates. For the most part, if you submit a question, you'll get full credit. Just try to make it a valuable exercise for you. Chances are, someone else has the same question and you'll be doing the class a favor if I end up addressing it during class.

In class participation (12% of your grade)

3. In-class exercises

We will be using learning catalytics to do 'clicker' questions in class. This program allows more flexibility (not just multiple choice) and does not require you to purchase a device. You will have to sign up for $12-13 on line, however. I am grading these activites based on completion only—not the number of correct answers you get. These questions will help you understand the materials and better prepare for exams. At times, we will use some visualization software to work with some of the concepts. Please download it to your computer here:

http://www.wolfram.com/cdf-player/

On line discussion (29% of your grade)

Details of the blog posts

This assessment is to practice using scientific arguments to critique a story or make a point to your peers. It will help you develop higher level analytical and critical thinking.

It is also a chance to interact with your class mates in a different way, and allows students who are shy about speaking up in class to share their thoughts with us all.

4. Blog posts: Impacts. You will write one post during our study of 'Impacts of climate change' in section 3. You will choose to write on one of the four topics by doodle poll, and the due date will depend on the topic you choose.

5. Blog posts: Implications. You will write one post during our study of 'Implications of climate change' in section 4. You will choose to write on one of the four topics by doodle poll, and the due date will depend on the topic you choose.

Specific guidance on how to approach the blog posts:

- Blogs will be posted TWICE to collab. First, post it to the appropriate 'assignments' space for grading. Second, post it on the forum tool—find the topic of your choice and submit your piece there to be read by your classmates. NOTE the due date: it varies by topic and posts will not be accepted after the due date. Your classmates are waiting on you. Their comments are due a couple days later—you cannot be late.
- Sources of material: Resources that might inspire you—worth watching every week—are the New York Times Science Section on Tuesday, and the front page and editorial pages of your favorite newspaper. Also, http://www.realclimate.org/ has excellent pieces on current issues in climate science and links to all sorts of excellent resources. You can also deconstruct a film, video, blog post, or clip from your favorite TV news channel.
- Writing the post:
    - Pick an article/video/piece to analyze
    - Determine main points
    - Find assumptions underlying main points
    - Give evidence from lecture and readings that supports, refutes, or questions those assumptions
    - Draw conclusions about the legitimacy of the claim
    - Write a one-page (200-250 words) critique, using full sentences, proper spelling and grammar, and appropriate technical terms. We want to hear your own voice and your own thoughts, but nevertheless, the writing is formal, as if in a paper.

- Rubric for grading Blog post (possible 25/25)
    - Include link to original piece (1 pt)
    - Keep it within 250 word limit (2 pts)
    - Write using full sentences, proper spelling and grammar, and appropriate technical terms (3 pts)
    - Identify main points of article, story, video, or film (4 pts)
        - Ask yourself, what is this about, and why did I find it interesting?
    - Describe assumptions underlying main points (5 pts)

        - What are the scientific issues or physical phenomena described or discussed in your piece? What ecological, physical, hydrological, or geological 'rules' are implicit in the discussion? (e.g. greenhouse gases hold heat; water is stored in the atmosphere, groundwater, surface water and oceans; organisms interact with their environment)
    - Give evidence from lecture and readings that supports, refutes, or questions those assumptions (5 pts)
        - Do the authors get the science right? if not, what are they NOT considering? If they get it right, what else should they consider?
    - Draw conclusions about the legitimacy of the claim and make your point about the piece (5 pts)
        - Evaluate the assertions (what they say), the assumptions (why they seem to be saying it), and the evidence (what you know from class and readings).

6. Reading 'impacts' blogs. In section 3, **you will select and read two posts in the forums of all four topics (a total of 8)**, and comment on one in each of two topics. So—read eight spread among the four topics, and comment on two, one in each of two topics. You are encouraged to read all the posts, of course! They will be interesting. But you are required to read eight. Be sure you 'mark as read' when you have finished—this leaves an electronic signature with the date and time that we will use for grading this component. **The reading part is graded by completion only.**

7. Commenting on 'impacts' blogs. After you read two from each section, **select and comment on one from each of two topics** (e.g. Sea level rise and health—so a total of two comments). **Deadlines** vary depending on the topic, and all the blogs on a given topic will be posted two days before the comments are due:

Sea level rise Comments due by Mar 28
Water Comments due by Apr 2
Ecosystems Comments due Apr 4
Health/infrastructure Comments due Apr 9

Specific guidance on how to comment *on this first set of blogs*:

- Read the post.
- Hit 'reply' on the reading/viewing panel (looks like you'll be sending an email, but it will post next to the forum)
- Write a brief comment (<50 words). Need not be formal, but must be respectful and kind.
- Use your own scientific arguments and evidence to respond to the critique, not just your gut.

- Rubric for grading Impacts Comments

- For this first set of blogs, we will grade **by completion only**, like the reading. Each will be worth 3 points, just like the pre-class quizzes. You will get full credit if you:
    - are respectful in tone
    - are thoughtful about what the blogger said, and make your comments relevant.
    - try to engage in the scientific aspects of the piece

8. Reading 'implications' blogs. In section 4, you will focus on two topics, reading 12 blog posts for each and commenting on three for each topic. Again, you are encouraged to read all of them, but the assignment is intended for you to become steeped in two of the topics, reading widely to get a sense for where the academic and/or popular dialogue is on impacts of climate change. Section 4 blog assignments are bigger; you will notice there is no exam for this part of the class. Instead you are doing a lot more reading and writing.

9. Commenting on 'implications' blogs. Pick two of the four topics. After you read 12 posts from each of two sections, choose three from each upon which to comment. Note the deadlines vary depending on the topic.

Specific guidance on how to comment on others' posts

- Read the original article or view the video.
    - Read the post again.
    - Hit 'reply' on the reading/viewing panel (looks like you'll be sending an email, but it will post next to the forum)
    - Use your own scientific arguments and evidence to respond to the critique
    - Write a brief comment (100 words) using full sentences, proper spelling and grammar, and appropriate technical terms. We want to hear your own voice and your own thoughts, but nevertheless, the writing is formal, as if in a paper.

- Rubric for grading Comments
    - Write with respect and kindness (1 pt)
    - Write using full sentences, proper spelling and grammar, and appropriate technical terms (1 pt)
    - Respond to the original piece (2 pts)
        - Let us know, by your comments, that you did actually look at the piece on which the post is based.
    - Response is related to the blog post (2 pts)
        - Be thoughtful about what the blogger said, and make your comments relevant.
    - Use your own scientific arguments and evidence to respond to the critique (2 pts)

- Try to engage in the scientific aspects of the piece and the blogger's response to it. The best comments will add a significant piece of scientific evidence to the conversation, challenge a piece of evidence mentioned by the original author or blogger, or both.

Rubrics

1. Rubric for grading Blog post (possible 25/25)
    - Include link to original piece (1 pt)
    - Keep it within 250 word limit (2 pts)
    - Write using full sentences, proper spelling and grammar, and appropriate technical terms (3 pts)
    - Identify main points of article, story, video, or film (4 pts)
        - Ask yourself, what is this about, and why did I find it interesting?
    - Describe assumptions underlying main points (5 pts)
        - What are the scientific issues or physical phenomena described or discussed in your piece? What ecological, physical, hydrological, or geological 'rules' are implicit in the discussion? (e.g. greenhouse gases hold heat; water is stored in the atmosphere, groundwater, surface water and oceans; organisms interact with their environment)
    - Give evidence from lecture and readings that supports, refutes, or questions those assumptions (5 pts)
        - Do the authors get the science right? if not, what are they NOT considering? If they get it right, what else should they consider?
    - Draw conclusions about the legitimacy of the claim and make your point about the piece (5 pts)
        - Evaluate the assertions (what they say), the assumptions (why they seem to be saying it), and the evidence (what you know from class and readings).
        -

Remember the instructions on how to construct a good post:

- Blogs will be posted on the forum tool, in collab—find the topic of your choice and submit your piece there. NOTE the due date: it varies by topic and posts will not be accepted after the due date.
- Sources of material: Resources that might inspire you—worth watching every week—are the New York Times Science Section on Tuesday, and the front page and editorial pages of your favorite newspaper. Also, http://www.realclimate.org/ has excellent pieces on current issues in climate science and links to all sorts of excellent resources. You can also deconstruct a film, video, blog post, or clip from your favorite TV news channel.
- Writing the post:
    - Pick an article/video/piece to analyze
    - Determine main points
    - Find assumptions underlying main points
    - Give evidence from lecture and readings that supports, refutes, or questions those assumptions
    - Draw conclusions about the legitimacy of the claim

- Write a one-page (200-250 words) critique, using full sentences, proper spelling and grammar, and appropriate technical terms. We want to hear your own voice and your own thoughts, but nevertheless, the writing is formal, as if in a paper.

2. Rubric for grading Comments (possible 8/8 pts)
    - Write with respect and kindness (1 pt)
    - Write using full sentences, proper spelling and grammar, and appropriate technical terms (1 pt)
    - Respond to the original piece (2 pts)
        - Let us know, by your comments, that you did actually look at the piece on which the post is based.
    - Response is related to the blog post (2 pts)
        - Be thoughtful about what the blogger said, and make your comments relevant.
    - Use your own scientific arguments and evidence to respond to the critique (2 pts)
        - Try to engage in the scientific aspects of the piece and the blogger's response to it. The best comments will add a significant piece of scientific evidence to the conversation, challenge a piece of evidence mentioned by the original author or the blogger, or both.

Remember the instructions on how to comment:

- Read the original article or view the video.
    - Read the post again.
    - Hit 'reply' on the reading/viewing panel (looks like you'll be sending an email, but it will post next to the forum)
    - Use your own scientific arguments and evidence to respond to the critique
    - Write a brief comment (100 words) using full sentences, proper spelling and grammar, and appropriate technical terms. We want to hear your own voice and your own thoughts, but nevertheless, the writing is formal, as if in a paper.