

Global Warming: Science and Impacts

AOS/GEOG/NIES 332

University of Wisconsin – Madison, Spring 2015

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<u>TA</u>	Ms. Niwaeli Kimambo / Science Hall 413 / kimambo@wisc.edu
<u>Lecture</u>	TR 11am-12:15pm / Science Hall 180
<u>Discussion Sections</u>	Meetings <i>alternating weeks</i> **301 week 1,3... / 302,303 week 2,4... / 305 week 3,5... ** 301: W 8:50-9:40am / AOS&S 811 302/305: M 12:05-12:55pm / Science Hall 350 303: M 1:20-2:25pm / Science Hall 350
<u>Office hours</u>	Professor McKinley: Tuesday 3-4:30pm TA Kimambo: Monday 2:30-4:30pm
<u>Course website</u>	Learn@UW, https://learnuw.wisc.edu
<u>Prerequisites</u>	AOS 100, GEOG/IES 120, 127, or equiv. Freshmen by permission.

COURSE DESCRIPTION:

Climate change is underway and will continue into the foreseeable future. This course offers a fundamental understanding of how and why global warming is happening, and what to expect in the future. Together, we will investigate and discuss the evidence for change, the science that explains these observations, predicted impacts on humans and ecosystems, and the societal debate over proposed solutions.

The course will begin with the science of global warming (weeks 1-7). In week 8, focus will shift to impacts across scales from global to local. From week 12-15, solutions, economics and decision-making will be addressed. My goal is to help you develop a well-grounded understanding of why climate change is happening, how it is likely to impact your life, and how you can be part of the solution to this grand challenge in global environmental stewardship.

GRADING:

1. Exams (3)	50% (Ex1 15%, Ex2 15%, Final 20%)
2. Discussion Section Exercises (7)	40%
3. Participation- Discussion and Lecture	10%

EXAMS:

Exams will cover lecture material and all lecture readings. There will be two non-cumulative exams, in-class on Tuesday 2/24 and Thursday 4/9. There will be a cumulative final exam on Monday 5/11/15 5:05-7:05PM (room TBD).

LECTURE READINGS:

Required Text: *Archer, D. 2012. Global Warming: Understanding the Forecast, 2nd ed., Wiley.*
Other Required Readings will be posted as PDFs on Learn@UW.

Readings due dates are on the last page of this Syllabus. In the case that a reading is listed as TBD, it will be available on Learn@UW under “Content” no less than one week before it is due.

DISCUSSION SECTION AND EXERCISES:

Discussion Sections are a mandatory component of this course. Each student should be enrolled in one, *and these will meet every other week*. You will hand in 7 exercises, one during each Discussion Section. With the exception of Discussion Section 1, these will be posted on

Learn@UW at least one week in advance of your meeting. These exercises will be detailed in the Discussion Syllabus and in handouts.

ACADEMIC INTEGRITY:

Academic integrity is expected from all students. Please make you are familiar with the expectations as outlined at <http://students.wisc.edu/doso/acadintegrity.html> and <http://students.wisc.edu/doso/students.html>. Failure of the course, at a minimum, will result if these standards are not respected.

POLICY ON ILLNESS:

The flu is bad this year, and many people are getting sick and staying sick for many days. Please note the following:

If you develop flu-like symptoms (fever with a cough and/or sore throat), it is a campus expectation that faculty, staff and students stay home from work and class and limit contact with others until you are completely free of fever for at least 24 hours, without the use of fever-reducing medications. This will take 3 to 5 days for most people. ---Dr. Sarah Van Orman, M.D., Executive Director, University Health Services

The best offense is a good defense! Try to avoid both getting sick and sharing your germs!

- Wash hands frequently, cough into your sleeve or disposable tissue, and avoid touching your nose, eyes and mouth.
- Get vaccinated. The vaccine is still available, and is well-matched with this year's flu.
- Eat well and get enough sleep.

MISSED LECTURE OR DISCUSSION SECTION:

You are expected to attend all lectures and all meetings of your Discussion Section. Your grade will suffer if you do not attend. If you miss either, it is your responsibility to make up the material.

If you miss lecture for illness, review the Lecture slides that will be posted on Learn@UW. Neither the TA or the Professor will respond to email requests with respect to missed lecture content, but we would be glad to discuss it in Office Hours once you have done all readings and studied the Lecture slides.

Please do not contact the Professor or TA to tell them you will miss one or two lectures. However, if a longer absence due to illness or other circumstances is required, do contact the Professor.

If you will miss a Discussion section for *illness*, contact the TA *in advance* so that you can reschedule for another Discussion section in which the same material will be discussed. This will be done only in the case of illness, and no more than once for each student.

ABBREVIATIONS for readings:

Archer = required text

IPCC = Intergovernmental Panel on Climate Change, <http://www.ipcc.ch>

IPCC AR5 = Fifth Assessment Report of the Intergovernmental Panel on Climate Change, 2013.

SPM = Summary for Policy Makers

TS = Technical Summary

WG1 = Working Group 1: Physical Science

WG2 = Working Group 2: Vulnerability of Socio-Economic and Natural Systems

WG3 = Working Group 3: Mitigation

USGCRP = US Global Change Research Program, <http://www.globalchange.gov>

WICCI = Wisconsin Initiative on Climate Change Impacts, <http://www.wicci.wisc.edu>

Week	Date	Topic	Reading
1	20-Jan	1 Introduction	Archer Ch 1 IPCC AR5 WG1 SPM
	22-Jan	2 Energy, Blackbodies and The Layer Model	Archer Ch 2,3
2	27-Jan	3 Atmospheric Composition and Greenhouse Gases	Archer Ch 3,4 IPCC AR5 WG1 TS pp. 50-52
	29-Jan	4 Planetary Energy Balance and Circulation	Archer Ch 5,6
3	3-Feb	5 Radiative Forcings	IPCC AR5 WG1 TS pp. 53-59
	5-Feb	6 Climate Sensitivity and Feedbacks	Archer Ch 7
4	10-Feb	7 Climate Sensitivity and Feedbacks	Archer Ch 7
	12-Feb	8 Carbon Cycle	Archer Ch 8,9,10
5	17-Feb	9 Carbon Cycle	Archer Ch 8,9,10
	19-Feb	10 Observed Climate Change	Archer Ch 11 IPCC AR5 WG1 TS pp. 37-52
6	24-Feb	11 Exam 1	
	26-Feb	12 Attribution to Human Activity	IPCC AR5 WG1 TS pp. 60-78
7	3-Mar	13 Future Climate Projections	Kolbert 2006 pp 97-110 IPCC AR5 WG1 TS pp.79-115
	5-Mar	14 Past Climate Change	IPCC AR5 WG1 Ch 5 (selection TBA)
8	10-Mar	15 Impacts: Introduction	IPCC AR5 WGII SPM Archer Ch 12
	12-Mar	16 Impacts: Cryosphere	IPCC AR5 WG1 Ch 4 (selection TBA)
9	17-Mar	17 Impacts: Agriculture	USGCRP 2009, pp 41-52, 71-78
	19-Mar	18 Impacts: Sea Level	IPCC AR5 WG1 Ch 13 (selection TBA) Nicolls (2011); Prep. for Rising Tide (2013)
10	24-Mar	19 Impacts: Hurricanes and Super Storms	USCCRP 2008, Extremes, S&A 3.3, pp 1-34 Is this the End - NYTimes - 24 Nov 2012
	26-Mar	20 Impacts: Ocean Acidification	The Dangers of OA (Doney 2006) Oceans Away (Grossman 2013)
11	7-Apr	21 Impacts: The Arctic	Arctic Climate Impact Asssment 2010, Ch 18
	9-Apr	22 Exam 2	
12	14-Apr	23 Impacts: Wisconsin and the Great Lakes	WICCI 2011 Ch 1,2 (p.6-41) WICCI 2011 Ch 6 (p.107-115)
	16-Apr	24 Impacts: National Security	Arab Spring (p 1-6); Climate / Social Stress (S1-S9); Climate / Naval Forces (p1-16)
13	21-Apr	25 Mitigation / Adaptation: Introduction	IPCC AR5 WGIII SPM
	23-Apr	26 Mitigation / Adaptation	Wagner & Zechhauser 2013
14	28-Apr	27 Mitigation / Adaptation	Reading TBA
	30-Apr	28 Mitigation: Geoengineering	Levitt & Dubner; Physics Today Feb 2013 (p.17-19); Royal Soc. 2009. Summary (ix-xii)
15	5-May	29 Economics and Decision Making	Archer Ch 13
	7-May	30 Economics and Decision Making	Reading TBA
	11-May	Final Exam. 5:05-7:05PM, room TBD	