

Global Warming: Science & Impacts

GEOG/AOS/NIES 332

SPRING 2018

Instructor: **Professor Jack Williams**, Department of Geography
Science Hall 207, jww@geography.wisc.edu Twitter: @IceAgeEcologist
Office Hours: Wednesday 2-3pm, Thursday 1-2pm, or by appointment.

TA: **Niwaeli Kimambo**, Graduate Student, Department of Geography
kimambo@wisc.edu
Office Hours: Tuesdays, 12:30 – 2:30p, Science Hall 544

Lectures: **HUMANITIES 2650, Tuesday/Thursday 2:30pm - 3:45pm**

Discussion Sections:

Sections 301, 304: Thursday 11-11:50am, 280C Science Hall
Sections 302, 305: Thursday, 12:05-12:55pm, 280C Science Hall
Sections 303, 306: Thursday 1:20-2:10pm, 280C Science Hall
Each discussion section will meet every other week. See Discussion Schedule for more information.

Course Websites & Social Media

Learn@UW: learnuw.wisc.edu (requires NetID)

INTRODUCTION

Climate change is underway and will continue into the foreseeable future - the question now is not if, but how much, and to what effect. Climate change is caused by a combination of natural processes and human alterations of the earth system, with the latter increasing in importance. Because climate directly or indirectly affects all aspects of our lives (and vice versa), it is essential for 21st-century citizens to be knowledgeable about climate science and policy. 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 climate change, the interplay among human and physical drivers, the science that explains these observations, predicted impacts on humans and ecosystems, and proposed solutions.

The first half of this class reviews the science of global warming. In the second half, the focus shifts to climate-change impacts across scales from global to local. In the last several weeks, we turn to a review of technological solutions, policy options, and decision-making frameworks. Our 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 managing and stewarding our earth system.

We intentionally teach to a broad range of students in this class, from majors in the environmental sciences and related fields to students pursuing degrees in international studies, economics, and communications to students simply interested in the topic. This intermediate-level course draws extensively on the findings from the most recent

Intergovernmental Panel on Climate Change reports (IPCC 2007 and 2013) and consists of a mixture of lectures, discussions, and self-directed exploration of on-line and published resources. An introductory background in earth system or atmospheric science (Geography/IES 120, 127; AOS 100, 101, or equivalent) is helpful but not required. This course fulfills the physical science requirement.

COURSE POLICIES

GRADE COMPONENTS

Discussion Exercises	30% (each discussion exercise is 5%)
Discussion and Class Participation	10%
Exam I	20%
Exam II	20%
Exam III	20%

EXAMINATIONS

There will be three exams that will mostly have a short-answer format. They will be non-cumulative, meaning that each will test to the material covered since the prior exam.

LECTURE READINGS

- 1) *Archer, D. 2012. Global Warming: Understanding the Forecast, 2nd ed., Wiley.*
- 2) *Houghton, J. 2015. Global Warming: The Complete Briefing, 5th ed., Cambridge U. Press*
- 3) *Selected readings.* The study of global warming is a fast-moving field, so textbooks tend to go out of date fairly quickly. Hence, this course relies heavily on additional readings. Readings and due dates are described in an accompanying document **Lecture Readings.** These readings will be posted as PDFs on Learn@UW

Both should be on reserve at the Memorial Library (Library). Reserve textbooks can be checked out for a few hours.

DISCUSSION SECTIONS AND EXERCISES

This course has six discussion sections, with three sections meeting each week. Enrollment and participation in Discussion Sections are a required component of this course. Students not meeting in discussion section usually will have readings or other preparatory activities in off weeks. See Discussion Syllabus for more information.

Each discussion meeting will have an accompanying exercise, usually a set of readings, an essay, or other assignment that must be completed in advance of the discussion meeting. Discussion exercises will be distributed using the Learn@UW course website. Exercises must be turned in during the corresponding discussion meeting. Overdue assignments will be penalized by a set amount per day after the due date.

COURSE COMMUNICATIONS – LEARN@UW, OFFICE HOURS

Learn@UW will be used to post news items, readings, assignments, and powerpoint slides from lecture. A copy of this syllabus can also be found there.

If you have questions about course material, we encourage you to visit us during our office hours – face-to-face conversation is usually the best way to clarify concepts, and we are here to help. We also encourage you to post questions to the Discussions Forum on LearnUW; we monitor this Forum regularly. We sometimes may repost answers to the Forum for questions sent to us by email.

MEDICAL ABSENCES AND MISSED CLASSES

You are expected to attend all lectures and all meetings of your Discussion Section. However, campus policy with respect to flu and other contagious diseases places a premium on minimizing the risk of spreading disease. Specifically, **if you are running a fever over 100°F with a cough or sore throat, stay home!** Wait until 24 hours after your fever breaks before returning to class. The flu usually takes 3 to 5 days to run its course.

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.

Regardless of reason, 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 nor 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.

If you will miss a Discussion section for illness, contact the TA *in advance* so that you can reschedule to another Discussion section covering the same material. This will be done only in the case of illness, and normally no more than once for each student. Studying with classmates is encouraged -- good venues for reaching out to your classmates include the Discussion forum on LearnUW.

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>.

ADDITIONAL RESOURCES FOR STUDENTS

- Joel Gruley, Geography Undergraduate Advisor. Joel is available to provide information about Geography or related majors, recommend courses, and give advice about Geography-related career directions. jgruley@wisc.edu
- McBurney Disability Resource Center. Provides services for an inclusive and accessible education. If you need accommodations, please talk to one of the instructors early in the semester or as soon as possible so we can plan to help you. <http://www.mcburney.wisc.edu/>
- Multicultural Student Center. Provides resources, advocacy and community particularly for students of color and historically underrepresented and underserved students on campus. <https://msc.wisc.edu>

- GUTS (Greater University Tutoring Service) tutoring. Contact to request tutors to help you with course material. <http://www.guts.wisc.edu/> The instructors or TAs also may know students offering tutoring.
- UW Writing Center. Provides drop-in or scheduled appointments for help. They will help with just about any type of writing assignments/needs. <http://www.writing.wisc.edu/>
- L&S Student and Academic Affairs. Contact for student advising and help with accommodations for health issues or other emergencies that may affect your ability to complete coursework. <http://saa.ls.wisc.edu>

Geography/AOS/NIES 332 Lecture Schedule, Spring 2019

Week	Date	#	Lecture Topic
1	1/22	1	Introduction, The IPCC
	1/24	2	Energy, Blackbodies & The Layer Model
2	1/29	3	Atmospheric Composition & Greenhouse Gases
	1/31	4	Planetary Energy Balance & Circulation
3	2/5	5	Radiative Forcings
	2/7	6	Global Carbon Cycle
4	2/12	7	Global Carbon Cycle
	2/14	8	Climate Sensitivity and Climate Feedbacks
5	2/19	9	Climate Sensitivity and Climate Feedbacks
	2/21	10	Earth System Models
6	2/26	11	Exam I
	2/28	12	Past Climate Variability
7	3/5	13	Detecting Climate Change
	3/7	14	Attribution to Human Activity
8	3/12	15	Future Climate Projections
	3/14	16	Impacts: Overview, The Arctic
	3/19		<i>Spring Break</i>
	3/21		<i>Spring Break</i>
9	3/26	17	Impacts: Ice Sheets & Sea Level Rise
	3/28	18	Impacts: Ocean Acidification
10	4/2	19	Impacts: Hurricanes & Extreme Events
	4/4	20	Exam II
11	4/9	21	Impacts: Terrestrial Ecosystems (part 1)
	4/11	22	Impacts: Terrestrial Ecosystems (part 2)
12	4/16	23	Impacts: Agriculture
	4/18	24	Impacts: National Security & International Relations
13	4/23	25	Solutions: Overview
	4/25	26	Solutions: Mitigation
14	4/30	27	Solutions: Adaptation
	5/2	28	Solutions: Climate Intervention (Geoengineering)
	5/8	31	Exam III (2:45-4:45pm, room TBD)