1-2013

GEO 108N.01A: Climate Change

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Climate Change – Past and Future (GEO/CCS 108N) – Spring 2013
TR 11:10 AM -12:30 PM
GBB (Gallagher Business Building) 106
3 credits

This course has a ***Moodle*** site: for the most up-to-date information
login via http://umonline.umt.edu/

Instructor
Molly F. Staats
Office: CHCB 355
Office hours: Tuesday 2:00 to 3:00, Wednesday 1:00 to 2:00, or by appointment
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Motivation and objective
Climate Change will provide an introduction to the geoscience perspective on the earth's climate system. The course will discuss climate processes and feedbacks, climate history from early earth to the ice ages, present and future changes due to natural processes and human activities. The primary goal of this course is for you to gain a broad understanding of the global climate system, its many components, and how this system undergoes change. While the material in this course has important social and economic implications, we will examine **only the science of climate change** and will generally *avoid policy and solution issues*. Further, our science will focus on the **physical processes of the climate system**, rather than climate change 'impacts'. By successfully completing this course you will improve your ability to: comprehend evolving issues in global change science, make inferences based on scientific observations, and interpret complex scientific data presented in graphs, figures and other formats. You can then use these tools to make informed decisions about climate change policy.

Required Materials
• TEXTBOOK: Climate Change: The Science of Global Warming and Our Energy Future, Edmond A. Mathez, 2009, Columbia University Press; 1 edition (March 31, 2009), **ISBN-13:** 978-0-231-14642-5. Available from the bookstore ($55 New, $40 Used) or from Amazon. **Do buy the book because you will need to read all of it.**

• An **i>Clicker is required** for this course and will be needed every class meeting. Overwhelming evidence suggests a positive correlation between attendance and academic success. Therefore, attendance will be monitored with i>clickers. More importantly, I want you to engage in the class. This is hard with over 100 students, but iClickers can get us part of the way there. There will be regular quizzes (where accuracy counts) and questions (to get you thinking) throughout lectures. Answering with your iClicker will get you attendance points and for the in-class quizzes, answering them correctly will get you additional points. You can drop/miss 6 classes (6 attendance and 6 in-class i>clicker quiz days), **thus no make ups or excuses for missed classes beyond that.**

You can purchase your clicker at the bookstore or elsewhere (~$28-$37). Use your i>clicker
Once you get into class. Then go to the website and register it. The website is http://www.iclicker.com. **Use your 790 number** (the number on your Griz card, NOT your netid - the user name that you use when logging into OneStop/Moodle) when registering your clicker, and enter your **name as it appears in the official university directory**. You should try to obtain your i>clicker as soon as possible so that you can begin using it in class. Used ones are fine, but it must be the i>clicker model – other brands will not work.

Course credit for i>clicker use in class will begin Tuesday, February 5th; it is your responsibility to have one by that date. Students caught cheating by bringing a fellow student's clicker to class in their absence will both receive an automatic F for the course and will be subject to academic penalty by the University.

Evaluation criteria for letter grade

The learning material for this course will come from a combination of lectures, in-class and take home exercises, and reading assignments in the textbook. The lecture will not necessarily cover the same material in the assigned reading. Additional reading assignments may be made along the way. Check the class Moodle site regularly for updates.

-Three exams (2 midterms, "1 final", all equally weighted): 60%
- In class exercises: 5%
- Take home exercise(s): 10%
- Course attendance/quizzes: 10%
- Reading quizzes: 15% (on-line on Moodle)
- Note that +/- grading will be used

Final grade breakdown: 93-100% = A; 90-92% = A-; 87-89% = B+; 83-86% = B; 80-82% = B-; 77-79% = C+; 73-76% = C; 70-72% = C-; 60-69% = D; Below 60% = F.

Please note: I do not grade "on a curve". But, at the end of the course, I will look to see if there is a reasonable number of "A" grades for a 100 level course. If not, I will find a natural break in the scores and give the necessary points to get a "reasonable" number of A grades overall. That number of points will then be given to all students. Therefore, your score at the end of the course may be adjusted upwards depending (but never down).

Quiz and Exam Dates:

- Note that all quizzes and exams are open book, open note. This means you will need to be organized (I highly recommend you print out the lecture notes and organize them in a notebook) AND you will need to think critically beyond just memorizing what is covered in the lectures and book.
- Ongoing: weekly quizzes on Moodle – for each book chapter take a quiz on the topics covered in the book. You will have two chances to take each quiz; your score will be the best out of the two attempts. Quizzes will open the Monday before assigned reading chapters and closed **1 ½ weeks** later, on Friday at 5 pm. Because you have 1 ½ weeks to complete the quiz, **there will be no make ups or excuses for missed quizzes.** You have 2, 60 minute attempts
- 3 Exams:
  1. Midterm: March 3
  2. Midterm April 9
  3. FINAL : May 14

  The final is not *technically* cumulative, but given that concepts later in the course rely on concepts from the beginning of the course, it is *effectively* cumulative.

  - On days of exams there will be no class. For midterms you have a 24 hour window to start the exam, while the final exam will be a 48 hour window. 1, 120 minute attempt.

Missing Exams: Attendance at all exams is mandatory, unless you can prove in writing that you were ill (written verification from physician) or had a death in your immediate family. In such situations, you must contact me ***before*** the exam to inform me of your absence. Missing an exam will result in a grade of 0 and no make-up will be given unless you meet the exception criteria above (verified illness or death in the family **AND** advance notification).

Other notes

1. **My Job:** Is to help you learn. I am passionate about scientific literacy and hope to help you understand the scientific process as well as climate science. I will work hard to provide an environment that supports multiple learning styles. **Your Job**: is to learn. This will require effort on your part. You will need to think critically, engage, and study. If you have any questions, concerns, or comments, I look forward to discussing these during my office hours or during an appointment.
2. **Prerequisites:** None, open to all undergraduates.

3. **Email.** The UM email policy requires that faculty "must use *only* UM's assigned student email accounts for all email exchanges with students, since such communication typically involves private student information." You are therefore required to send correspondence to us through your UM email system account—we cannot, *and will not*, respond to you through other accounts, so please make sure to check this when you send email. You may communicate with me by email, but realize there is one of me and many of you. Please try and come to office hours or ask questions at the beginning of class. If you miss class, please do not email me to ask what you missed- check Moodle and/or talk to classmates. In general, if you do not receive a response to your email, it is because I did not think email was the appropriate medium for the question. **I teach several courses so please make sure that all emails contain the Course: Climate Change and your full name**
4. **Moodle:** You will be using Moodle extensively. Log-in and get acquainted with the site. Moodle works best with the latest version of Firefox (So, download it if you do not have Firefox, or update if you do). You do not want to be in the middle of a quiz or an exam and not know how to navigate the site! http://umonline.umt.edu/.
5. **Academic Integrity:** All students must practice academic honesty. Academic misconduct is subject to an academic penalty by the course instructor and/or a disciplinary sanction by the University—these can be quite severe, so all students need to be familiar with the Student Conduct Code. The Code is available for review online at: http://life.umt.edu/vpsa/student_conduct.php
6. **Equal Access:** Whenever possible, and in accordance with civil rights laws, the University of Montana will attempt to provide reasonable modifications to students with disabilities who request and require them. Please feel free to setup a time with me to discuss any modifications that may be necessary for this course. For more information, visit the Disability Services for Students website at www.umt.edu/dss/.
7. **Classroom courtesy**: This will be a large class and the classroom can be expected to be full. Please be considerate of your classmates. Please do not engage in extraneous talking and other distracting behavior in the classroom.

	UPDATED: 1/23/2013 ***Climate Change 108N Spring 2013*** *Exam and quiz dates are fixed; lecture topics may change.*			
1	1/29	Course requirements & introduction		
2	1/31	Introduction to the Science of Climate Change	Chapter 1-Context	***Extra Credit Practice quiz closes 2/8***
	PART I: How the Climate System Works			
3	2/5	Anthropogenic forcing: Can humans be a factor?; Introduction to Earth's energy balance	Chapter 2- Atmosphere	***Start i>clicker use***
4	2/7	Earth's energy balance cont'd and the greenhouse effect		***Chapter 2 quiz due 2/15***
5	2/12	Atmosphere structure, composition and circulation I	Chapter 5 – Sci. Framework	
6	2/14	Atmospheric II and Ocean structure, circulation I		***Chapter 5 quiz due 2/22***
7	2/19	Ocean Circulation II, Global climate controls, Atmosphere-Ocean Interactions	Chapter 4- Carbon cycle	
8	2/21	Carbon cycle I		***Chapter 4 quiz due 3/1***
9	2/26	Carbon cycle II	Chapter 3- Oceans	
10	2/28	Scientific method, peer review, IPCC		***Chapter 3 quiz due 3/8***
	3/5	***Exam -1 NO CLASS, TAKE THE TEST ON MOODLE anytime between 12:01 a.m. and 11:55 p.m.***		
	PART II: How Climate Changes and How We Measure It			
11	3/7	How climate changes - forcings		
12	3/12	Measuring global temperatures – temporal and spatial averaging I	IPCC reading	
13	3/14	Measuring global temperatures – temporal and spatial averaging II		***IPCC quiz due 3/22***
14	3/19	Measuring change; deciphering trends I Homework Exercise – Make your very own climate model at home!	Chapter 6 - History	
15	3/21	Measuring change; deciphering trends II		***Chapter 6 quiz due 3/29***
16	3/26	Paleoclimate: Proxies: tree rings, sediments, pack rats, etc.		
17	3/28	Paleoclimate: Stable isotopes, ice sheets, ice cores, Vostok		**Time Series Exercise Due**
	4/1-4/5	***Spring Break NO CLASS***		
	4/9	***Exam -2 NO CLASS, TAKE THE TEST ON MOODLE anytime between 12:01 a.m. and 11:55 p.m.***		
	PART III: Past, Present, and Future Climate Change			
18	4/11	Early earth climate changes – the last 55 Ma		
19	4/16	Ice Age theories – the last 500 Ka	Chapter 7 – Last century	
20	4/18	Climate of the last 1000 years		***Chapter 7 quiz due 4/26***
21	4/23	Future climate-1 Models of future climate	Chapter 9 – Models/future	
22	4/25	Future climate-2 Assessing models		***Chapter 9 quiz due 5/3***
23	4/30	Fish, fires, fungus: a few impacts	Chapter 10 - Energy	
24	5/2	Sea level rise & Ocean pH change		***Chapter 10 quiz due 5/10***
25	5/7	Guest Lecture	Chapter 8 - SLR	
26	5/9	Solutions and Energy use		***Chapter 8 quiz due 5/17***
	5/14	***Exam-3, Final Exam: NO CLASS, TAKE THE TEST ON MOODLE*** ***Test Opens Tuesday, May 14 at 12:01 a.m., closes Wednesday, May 15 at 11:55 p.m.***		