1-2014

GEO 482.01A: Global Change

Johnnie N. Moore
University of Montana - Missoula, johnnie.moore@umontana.edu

Geology 482 - Global Change, Spring 2014

Instructor: Professor J. N. Moore (johnnie.moore@umontana.edu)
Office CHCB 363

Goals/Objectives

1) **Learn the theoretical and analytical foundations of the processes affecting Earth's climate**, emphasizing energy balance, energy distribution processes and controls at the planetary scale over different time scales (historical to geologic). We will do this with a combination of readings, lectures/discussions and exercises. Exercises will require the application of both analytical and numerical methods to learn fundamental processes controlling Earth's climate (see below). Readings will be from the primary scientific literature and other sources which will require considerably study, note taking and thought. We will rely heavily on papers from geoscience journals so you will need to be come comfortable with assessing complex topics in that format, rather than the textbook format.

2) **Develop tools to analyze climate data over a range of temporal and spatial scales**, from regional historical data to global geologic data. We will use the integrated statistics and programing language R for data analyses and analytical and numerical exercises. This will require that you learn to "code" in R if you do not know how (I expect most people will not). This will be challenging and require a large amount of time outside class developing your skills. Experimentation is essential to learn how to code and how to apply programs you develop to solve problems. Learning that skill is a major objective of the course. You will also need to learn some basic statistics to apply your coding skill to identifying questions/hypotheses and testing them. We will acquire our statistical knowledge through application to problems and reading.

3) Use your newly acquired knowledge and skills in climate geoscience to identify and research an original problem/question in climate geoscience. You will build models or download data to explore tquestions using appropriate plotting and statistical tools. Your objective will be to write a short, original, professional research paper on your analyses/modeling and present it to the class.

Background Required

Climate science is grounded in geology, physics, math, and chemistry (and to a lesser extent, biology). This course will emphasize the physics (and the associated math), geology and physical chemistry of global climate change. This is a very challenging course and to succeed you will need a high level of scientific knowledge along with geoscience fundamentals. Upper division standing in Geosciences with completion of the major core and cognate sciences are the basic prerequisites for the course. Upper division standing in many other natural science disciplines should also be ample preparation. If you have no college science preparation, especially in physics, chemistry and math, this course will not be accessible to you.

Grading and Exams

This class will require an extensive amount of work outside of class (minimum of 6-8 hours/week). It will be extremely difficult for you to catch up if you get behind, because later material will build on earlier material. So, if you have problems see me immediately.

There will be at least two "midterms" (~100 points each) during the term. There will be **no makeup exams** except for documented medical or family emergencies. There will be class and homework assignments (~100 points), a research paper (~100 points) and an in-class presentation (25

points). I may modify the number and weight of these items depending on our progress, so consider the above as a guide. Your final grade will be earned based on the following distribution: >90%, A; 80-89%, B; 65-79%, C; 50-64% D; and, <50%, F. There is no extra credit or additional work to modify grades you receive. This distribution may be modified to accommodate +/- grading or course progress.

All homework assignments are due the following class meeting at the beginning of the class, or when designated. **I will not accept late homework**. You should be ready to discuss and present your answers to the class if called upon. Be organized, neat and complete on all assignments. You must type, plot and print out all assignments. I expect professional presentation, accuracy, and correct grammar. No hand written, hand plotted or other hand drawn materials will be accepted unless I expressly say it will be acceptable.

We will communicate when not in class via your **UM email**. UM rules do not allow me to communicate through off-campus email accounts or other social media. I will upload all readings and assignments to *Moodle* or give assignment in class. Please check the GEO 482 *Moodle* space often for important announcements and information.

I expect you to know and be able to use all material given in class and in all readings. I will not give out lecture notes, so you will need to take detailed notes in class and combine those with readings to have a complete understanding of the material. There will be no practice exams, no study guides, and no review sessions for exams. I expect you to do all the preparation on your own and have a complete command of all information covered. If you have questions make sure to see me well before exams. This is a rigorous course and requires hard work.

Schedule

The term has 15 weeks counting spring break (spring break is Mar. 31 – Apr. 4). There are three main sections to the course. The timing for these are (expect changes depending on our progress):

I) Learning and applying fundamental principles and mastering R (~6 weeks: 28Jan-06Mar).

II) Application to paleo and historical datasets (~4 weeks: 11Mar-03Apr).

III) Research and writing term paper (~5 weeks: 08Apr-08May).

Presentations, May 8 and on final exam day, May 14, 1:10PM

Student Conduct

The UM Student Conduct Code will be enforced for all aspects of this class. You should make sure you understand your academic responsibilities under the code (especially section IV) by reading it at this link: http://www.umt.edu/self-study2010/std3/Std3Exhibits/RE3-01/StudentConductCode.pdf

Students with Disabilities

University of Montana assures equal access to instruction through collaboration between students with disabilities, instructors, and Disability Services for Students. If you think you may have a disability adversely affecting your academic performance, and you have not already registered with Disability Services, please contact Disability Services in Lommason Center 154 or 406.243.2243. I will work with you and Disability Services to provide an appropriate modification.