

## ***Earth's Changing Climate (Geo 318)***

3 credits | T/TH 12.30 to 1.45 | Remote live via Zoom

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Note: *This Course has a Moodle Site. A detailed class schedule and other information will be posted there with frequent updates, so check the site regularly.*

### **Instructor information**

Dr. Joel Harper

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### **Office hours:**

T: 2:15-3-15; W: 11-12

Or, email me anytime to setup an appointment for other times.

### **Course content**

This course is about the future of our climate from the perspective of climate system dynamics. The first module covers earth's heat balance, the basis of climate change. The second module explores climate variability stemming from internal dynamics of the climate system. The final module examines the grand challenge in climate science: projecting future change with regards to uncertainties about the climate system. Throughout the course, outstanding scientific problems in climate science will be examined with regards to emerging research.

### **Learning outcomes**

*Specific:*

- illustrate earth's energy balance and the details of why it changes with greenhouse gas concentration.
- describe the general processes governing global heat flow through oceans and atmosphere.
- integrate and explain global energy feedbacks, couplings, and imbalances over a range of scales.
- describe how modern anthropogenic change differs from natural climate variability.

*Overarching:*

- interpret, access, and reconcile the many new and important discoveries in climate science that will emerge over a person's lifetime.

### **Format**

Classes will consist of lectures and discussions, in-class exercises, and out-of-class exercises. A major component of this course is completing the assigned reading and preparing for class discussions. Lectures will not necessarily cover all material presented in the reading, nor will all material presented in the lectures be replicated by the reading material. However, exams will cover material from both the lectures, assigned reading, and discussions.

### **Prerequisites**

Prerequisites: Junior Standing; Math 151 (pre-calculus). Familiarity and comfort with computers will be necessary.

### **Course text**

Introduction to Modern Climate Change, 2nd Edition, Andrew Dessler, Cambridge Univ. Press, 2016, isbn: 9781107480674. Rent, or buy used/new from Amazon: about \$20 to \$40.

### **Evaluation criteria for letter grade**

- In-class exercises, discussions, and problem sets (formative assessment): **40%**
- Three equally weighted exams (summative assessment): **60%**

### **Schedule**

A tentative schedule with detailed topics has been posted on the Moodle site. Note that this schedule is subject to change as the course progresses. The course topics in particular may be adjusted. However the following dates will not be changed.

Midterm, Exam-1:	<i>Tuesday 22-September</i>
Midterm, Exam-2:	<i>Thursday 20-October</i>
Final, Exam-3:	<i>Monday 23-November (10.10 AM)</i>

### **Policies**

**Emailing:** We may occasionally conduct email correspondence with class members and we will use official UM email addresses. All email sent to us must originate from your official UM email address. Email originating from non-UM addresses cannot be read or responded to (Sorry, but this is the law we are required to follow).

**Attendance:** No formal attendance will be taken. However, the format of this course requires class attendance for success. Substantial course content (i.e., graded in-class exercises and discussions) and information transfer will only occur in class. We cannot accommodate individual make-ups for missed classes. This is not a good course for you if you expect to miss class, even occasionally.

**Due dates:** All assignments are due at the start of class on designated due date.

**Disabilities:** The 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 Lommasson Center 154 or 406.243.2243. I will work with you and Disability Services to provide an appropriate modification.

**Conduct Code:** 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. All students need to be familiar with the Student Conduct Code. The Code is available for review online at: [http://www.umt.edu/vpsa/policies/student\\_conduct.php](http://www.umt.edu/vpsa/policies/student_conduct.php).