

GEOGRAPHY 106
PHYSICAL ENVIRONMENTAL GEOGRAPHY II
Dr. D. Scott Mackay, Instructor

Course Objectives

The specter of global warming is constantly in the news – high temperatures, low lake-levels, big storms and growing deserts. It is still unproven, however, if the present climatic extremes are in fact due to human activities. Because climate change involves big stakes in terms of the environment, business, and politics, there are heated debates by vested interests as to whether humans are in fact causing climatic change and, if so, whether the impacts will be severe enough to be worth avoiding.

We will try and sort through these issues by applying the lens of science. Science provides us with theory to understand why climate changes, and with models to predict how global climatic and environmental conditions may change in the future. We will examine: the Earth systems responsible for our modern climate, how humans may be causing climate to change, what evidence there is for such change, how the climate changes may modify other components of our environment (e.g. ocean levels and food production), and how through policy and technology we may limit the degree of change.

Required Text

Kump, L.R., J.F. Kasting, and R.G. Crane. 2004. *The Earth System*, 2nd Edition, Prentice-Hall, Upper Saddle River, NJ.

Lectures

Your lectures will consist of material from the text that I think is most important and interesting. Your tests will be based only on this lecture material, in addition to *specific* readings *assigned in class*. If you do not attend class and rely exclusively on the text for information, expect to have to know a lot more material for exams than if you attended lecture and wrote complete notes.

Out of respect for your classmates, it is expected that you will be quiet during the whole class. If you find there is too much noise in the class, please either let out a loud “SHUSH” or let Dr. Mackay know that someone is being noisy. Without such feedback, it is not possible for me to know whether you are being disturbed. If you arrive late or leave early, then please use the doors at the rear and sit on the edge of a row. Otherwise, please sit at the center of a row so that others don’t walk in front of and bother you.

Grading

Your final grade will be based exclusively on three tests worth 20, 25, and 25% of your final mark, respectively, and ten (10) laboratory assignments worth 30% of your final mark. The tests will be multiple-choice, and each test will consist of approximately 50 questions. The instructor reserves the right to alter the format and length of the exam as is deemed necessary. These tests will be non-cumulative. You must show picture ID (e.g. UB card) when you hand in your exam.

Make-up tests will only be given where a student contacts me either before or on the day of the scheduled test and offers an acceptable excuse. Makeup exams must to be taken no more than seven (7) days after the scheduled exam date, excepting where prolonged illness prevents this. In the case of an illness or accident a medical certificate from either a doctor or Health Services will be required. If proper documentation is not presented, then, at the discretion of the instructor, the makeup exam may differ in content and form from the regular exam. Under no circumstances will a student be permitted to take more than one makeup test.

The labs allow you to explore ideas related to climate change. You must attend the lab-time to obtain marks for your work. Detailed instructions regarding lab attendance and marking are given out in the first week of labs; be sure to read them carefully.

To pass this course you must obtain a minimum of a D grade in the lab portion of the course, and a minimum of a D in the exam portion of the course. If you pass the exams and fail the labs, or pass the labs and fail the exams, you will obtain an F in the course. There are no exceptions. The following table describes how numerical grades will be translated into letter grades:

| | | | |
|----|-----------------|----|-----------------|
| A | (88% or higher) | C+ | (68% to 71.99%) |
| A- | (84% to 87.99%) | C | (64% to 67.99%) |
| B+ | (80% to 83.99%) | C- | (60% to 63.99%) |
| B | (76% to 79.99%) | D+ | (56% to 59.99%) |
| B- | (72% to 75.99%) | D | (52% to 55.99%) |

Office Hours

Should you have any problem or question regarding the course, I will always be available in my office (113 Wilkeson Quad, Ellicott Complex) from 10 a.m. to 12 p.m. on Wednesdays. If you wish to make an appointment for some other time, my office number is 645-2722 ext. 64 and my email address is dsmackay@buffalo.edu.

Tentative Schedule

| DATE | MODULE | LEC# | TOPIC | READINGS | LAB |
|---------------|-------------|------|------------------------------------|----------|-----------------------|
| 31-Aug | Atmosphere | 1 | Introduction to Global Change | Ch. 1 | Finding Resources |
| 2-Sep | and Oceans | 2 | An Introduction to Systems | Ch. 2 | |
| 7-Sep | | 3 | Planetary Energy Balance | Ch. 3 | Scientific Method |
| 9-Sep | | 4 | The Greenhouse Effect | | |
| 14-Sep | | 5 | Atmospheric Circulation | Ch. 4 | |
| 16-Sep | | | Yom Kippur (no lecture) | | |
| 21-Sep | | 6 | Oceanic Circulation | Ch. 5 | Simple Analysis |
| 23-Sep | | 7 | Numerical Models of the Atmosphere | Ch. 6 | |
| 28-Sep | | | EXAM #1 (worth 20 points) | | |
| 30-Sep | Biogeochem. | 8 | Carbon Budgets | Ch. 7, 8 | |
| 5-Oct | Cycling | 9 | Carbon Cycles | | Building models |
| 7-Oct | | 10 | Ecosystems | Ch. 9 | |
| 12-Oct | | 11 | Biodiversity | Ch. 13 | Carbon Emissions |
| 14-Oct | | 12 | Origins of Life | Ch. 10 | |
| 19-Oct | | 13 | Rise of Oxygen | Ch. 11 | Carbon Uptake |
| 21-Oct | | 14 | Controls on Atmospheric Oxygen | | |
| 26-Oct | | 15 | Long-Term Climate Regulation | Ch. 12 | Climate Warming Rates |
| 28-Oct | | 16 | Glacial Climates | Ch. 14 | |
| 2-Nov | | | EXAM #2 (worth 25 points) | | |
| 4-Oct | Climate | 17 | Holocene Climates | Ch. 15 | |
| 9-Oct | Change | 18 | Present Climates | | Physical Comfort |
| 11-Oct | | 19 | Changes to Carbon Budgets | Ch. 16 | |
| 16-Oct | | 20 | Consequences of Global Warming | | Vegetation Responses |
| 18-Oct | | 21 | Ozone Depletion | Ch. 17 | |
| 23-Oct | | | TBA | | |
| 25-Oct | | | Thanksgiving (no lecture) | | |
| 30-Oct | | 22 | Threats to Ecosystems | Ch. 18 | Mitigation |
| 2-Dec | | 23 | Future Climates | Ch. 19 | |
| 7-Dec | | 24 | Review | | |
| 9-Dec | | | EXAM #3 (worth 25 points) | | |